COUNTWAY LIBRARY
HC 2ECJ X

Daniel Walden, M.D.
336 Centre Street
Jamaica Plain, Mass.

Helmer F. Larsson
~~Dec 23 1928~~

BOOKS

BY

EDWARD P. DAVIS, M.D.

Operative Obstetrics

Octavo of 483 pages, with 264 illustrations. Cloth, $5.50 net; Half Morocco, $7.00 net.

Obstetric and Gynecologic Nursing

12mo of 436 pages, with 90 illustrations. *Third Edition.* Buckram, $1.75 net.

OPERATIVE OBSTETRICS

INCLUDING

THE SURGERY OF THE NEWBORN

BY

EDWARD P. DAVIS, A.M., M.D.

Professor of Obstetrics, Jefferson Medical College; Obstetrician to the Jefferson Hospital; Obstetrician and Gynecologist to the Philadelphia Hospital; Consultant to the Preston Retreat; Member of the American Gynecological Society, International Congress of Obstetrics and Gynecology, College of Physicians of Philadelphia; Honorary Member of the Chicago Gynecological Society, Medical Society of the State of Virginia, Academy of Surgery of Bucharest, Ophthalmological Society of Egypt, etc.

WITH 264 ILLUSTRATIONS

PHILADELPHIA AND LONDON

W. B. SAUNDERS COMPANY

1912

BOSTON MEDICAL LIBRARY
IN THE
FRANCIS A. COUNTWAY
LIBRARY OF MEDICINE

Copyright, 1911, by W. B. Saunders Company

Reprinted April, 1912

PRINTED IN AMERICA

PRESS OF
W. B. SAUNDERS COMPANY
PHILADELPHIA

PREFACE

The recent development of obstetric surgery has reached a point where it seemed to the writer that a concise statement of methods of operating in obstetrics at the present time might be of service to the profession. The effort has been made to condense the subject matter. Bibliographies have been added for the convenience of those who may wish to consult the literature.

The writer desires to express his thanks for permission, given by recent writers upon the subject, to reproduce their illustrations.

E. P. D.

250 South Twenty-first Street,
Philadelphia, Pa.

CONTENTS

PAGE

Introduction 17
Anatomy 17
The Condition of the Birth-canal Regarding Asepsis 24
Conditions Preventing and Controlling Hemorrhage in Normal Labor. 27
The Pregnant Woman as a Surgical Patient 28
Obstetric Anesthesia 29
The Technic of Obstetric Surgery 39
Obstetric Operations in Hospitals 39
To Conduct Obstetric Operations in Private Houses 45
Assistants for Obstetric Operations 49

PART I

The Surgery of Pregnancy 51
Uterine Displacements 51
Repair of Lacerations of the Uterus During Pregnancy 56
The Removal of Uterine Tumors During Pregnancy 56
Operations upon the Fallopian Tubes and Ovaries 62
Operations upon the Pelvic Floor and Perineum During Pregnancy 65
Operations upon the Rectum During Pregnancy 66
Emptying of the Uterus Before Viability; Therapeutic Abortion 66
Emptying the Uterus after Viability and Before Full Term; The Induction of Labor 69
Rapid and Forcible Dilatation of the Womb 89
Operation for Appendicitis 93
Cholecystotomy in Pregnancy 96
Operations upon the Kidneys During Pregnancy 97
Abdominal Section During Pregnancy 99
Operation for Ectopic Gestation 100

PART II

The Surgery of Labor 117
The Extraction of the Child Through the Vagina 117
Manual Extraction of the Fetus Through the Vagina 130

PAGE

Delivery by Forceps ... 163
Version ... 210
Embryotomy ... 237
Vaginal Extraction Preceded by Enlargement of the Birth-canal ... 257
Postural Enlargement ... 257
Section of the Pelvis ... 261
Symphyseotomy ... 261
Pubiotomy ... 267
Vaginal Extraction Preceded by Section of the Cervix, Lower Uterine Segment, or Perineum ... 287
Incision of the Cervix ... 287
Vaginal Cesarean Section ... 289
Incision into the Pelvic Floor and Perineum ... 299
Delivery by Abdominal Section ... 300
Celiohysterotomy ... 301
Delivery by Abdominal Section with Sterilization ... 314
Celiohysterectomy with Intrapelvic Treatment of the Stump ... 315
Celiohysterectomy with Extraperitoneal Treatment of the Stump (Porro's Operation) ... 320
The Results of Delivery by Abdominal Section in the Writer's Experience ... 327
The Treatment of Rupture of the Uterus ... 328
Total Extirpation of the Pregnant Womb ... 330
Suprasymphyseal Section ... 333
Extraperitoneal Section by Inguinal Incision ... 341
Rupture of the Uterus ... 349
Inversion of the Uterus ... 359

PART III

The Surgery of the Puerperal Period ... 365
The Removal of the Placenta ... 365
The Control of Hemorrhage During Labor ... 371
The Control of Hemorrhage after Labor (Postpartum Hemorrhage) ... 376
Placenta Prævia ... 390
Premature Detachment of Normally Implanted Placenta ... 397
The Immediate Repair of Lacerations of the Genital Tract ... 401
The Intermediate Repair of Lacerations of the Genital Tract ... 413
The Late Repair of Lacerations of the Generative Tract ... 414
The Correction of Uterine Displacements Following Labor, With or Without Lacerations ... 419
Diastasis of the Recti Muscles and Relaxation of the Abdominal Wall Following Labor ... 422
The Technic of Operations for the Repair of Lacerations and the Correction of Displacements ... 422
The Surgery of Puerperal Septic Infection ... 424
Puerperal Mastitis ... 436

PART IV

PAGE

THE SURGERY OF THE NEWBORN 441
Asphyxia 441
Umbilical Hemorrhage 442
Umbilical Hernia 443
The Surgical Treatment of Fractures in the Newborn 444
The Surgical Treatment of Brachial Palsy in the Newborn 449
Injuries to the Scalp 453
Lesions of the Face and the Organs of Special Sense 456
Congenital Lack of Development 458
The Surgical Treatment of Infection in the Newborn 459
Circumcision 460

INDEX 465

OPERATIVE OBSTETRICS

INTRODUCTION

ANATOMY

The Anatomy of the Birth-canal During Pregnancy.—The intelligent performance of obstetric operations requires practical knowledge of the anatomy of the birth-canal during the various periods of gestation.

Position of the Womb During Development.—In the majority of cases the womb is anteverted and slightly anteflexed at the beginning of pregnancy. After the first few weeks the body of the womb becomes globular, but steadily maintains a slightly anteverted position. In thin subjects the fundus can plainly be felt through the abdominal wall behind the pubes at from four to six weeks. In stout patients the fundus may not be distinguished until eight or nine weeks have passed.

So frequent are retroflexions and anteflexions that the obstetrician is often called upon to operate in early pregnancy under these conditions.

In retroflexion the body of the womb enlarges steadily, and, in proportion as retroflexion is complete, spreads in the pelvis from side to side, in extreme cases fitting itself closely under the promontory of the sacrum. The degree of pressure made by the growing womb will depend upon the size of the pelvis and relative size of the womb. In a capacious pelvis the body of the womb very slowly assumes a more or less globular shape with but little pressure. Where the pelvis is small, considerable pressure develops early. The rise of the retroflexed gravid womb depends greatly on freedom from abdominal

pressure. Where the patient is recumbent, and the urinary bladder is not allowed to fill sufficiently to make pressure, a retroflexed womb rises spontaneously in the great majority of cases.

In cases of extreme retroflexion in anemic, flabby young patients, the womb may be so soft as to simulate very closely an extravasation of blood or collection of pus in Douglas' cul-de-sac.

In anteflexion of the pregnant womb the fundus is bent sharply forward, and womb, tubes, and ovaries are pressed downward, the bladder is forced downward with the womb, and the condition is accompanied by spasm of the pelvic muscles, which may be termed pelvic tenesmus.

Size of the Womb During Development.—The size of the womb during pregnancy will depend greatly upon the stature and development of the patient, the size of the fetus, and the general vigor of the mother. In the average patient when the fundus can be recognized by abdominal pressure the patient is six weeks advanced. At twelve weeks the fundus is little less than midway between the pubes and the umbilicus. At twenty-four weeks the fundus has reached the umbilicus. At twenty-eight weeks it is two fingers above. At thirty-two weeks, a hand's breadth. At thirty-six weeks, once and a half the breadth of the ordinary hand.

In primiparæ signs of descent and engagement become evident from the thirty-fifth week on, in proportion to the relative size of mother and child. Where slight disproportion exists, the mother's general condition good, the action of the uterine and abdominal muscles brings the child into the upper pelvis comparatively early. In multiparæ the fetus will remain above the pelvic brim indefinitely, in proportion to the size of the pelvis and the firm or relaxed condition of the mother's tissues.

Bibliography of Uterus During Development

Alfieri: Annali di Ostetricia, No. 1, 1903.
Blacker: Transactions of the Obstetrical Society of London, p. 235, 1900.
Czyzewicz: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 785, 1907.

von Fellenberg: Archiv f. Gynäkologie, Band 71, Heft 2, 1904.
Ferroni: Annali di Ostetricia, October and November, 1902, and No. 8, 1902.
Haultein: British Medical Journal, p. 1279, 1900.
Kleinwächter: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 4, Heft 1, 1899, and Band 41, Heft 3, 1899.
Nikolic: Zentralblatt f. Gynäkologie, No. 3, 1900.
Piskacek: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 13, Heft 3, 1901.
Stephenson: Scottish Medical Journal, January, 1905.

The Position of the Womb During Labor.—At viability and after, in the presence of labor, the birth-canal becomes a continuous channel,

Fig. 1.—Frozen section of primipara dying in labor. First position of vertex (Bumm and Blumreich).

whose axis is directed first downward and backward, then upward and forward. As uterine contractions develop the round ligaments contract, drawing the fundus forward over the pelvic brim. The contraction of the abdominal muscles helps in maintaining this position, the combined action of uterus and abdominal muscles forcing

the fetus downward. In introducing instruments into the womb during labor, the operator must remember the anterior position of the body of the womb. In unskilful operations instruments have been forced through the posterior vaginal fornix, cervix, and lower uterine segment, the operator supposing that he was carrying the instrument into the womb.

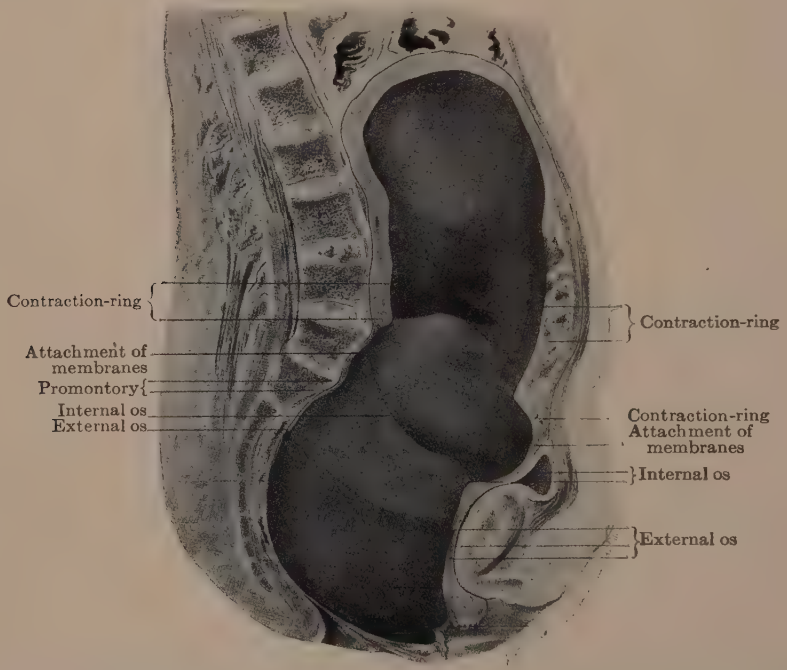

Fig. 2.—Frozen section of woman dying in labor. Head on pelvic floor; contraction-ring high up posteriorly (Bumm and Blumreich).

The position of the womb during labor is influenced somewhat by the mechanism of labor; the posterior portion of the lower uterus and the vagina are carried backward by posterior rotation of the occiput. In shoulder presentations the womb is abnormally distended and its characteristic position is lost. This is also true in cases where operations for fixation of the uterus have been performed.

The expulsion of the placenta, membranes, and cord occurs in what is practically a second labor. The fundus remains forward dur-

ing the third stage and the axis of the birth-canal is practically the same as that of the second stage of labor.

The Pelvic Floor, Vagina, and Perineum During Labor.—In spite of the differences of opinion as to what constitute the supports of the uterus, and exactly what is meant by the pelvic floor, for practical purposes Hart's division of the pelvic floor into anterior and posterior segments will be found of practical value. The axis of the uterus meets the pelvic floor near the sacrococcygeal junction; in proportion to the strength and development of the levator ani muscle, the axis is thence turned upward and forward beneath the pubes. The posterior segment of the pelvic floor during labor exerts intermittent pressure upon the presenting part, forcing it toward the outlet, and causing, when such is possible, rotation. Remembering this important function in forceps operations, the head is brought strongly down upon the pelvic floor, where rotation is incomplete, with the hope that, by this aid, rotation may be accomplished.

The anterior segment of the pelvic floor, comprising the anterior vaginal wall, the urethra and tissues about it, is drawn strongly upward during the expulsion of the child, the function seeming to be to withdraw the urethra and neck of the bladder as much as possible from injury.

Bibliography of Pelvic Floor, Vagina, and Perineum: Anatomy and Functions of

Paramore: Journal of Obstetrics of the British Empire, February, 1909; March, 1909.

Studdiford: American Journal of Obstetrics, July, 1909.

Bibliography of the Anatomy of the Birth-canal During Pregnancy

Aschoff: Berliner klin. Wochens., No. 31, 1907.

Bayer: Beiträge f. Geburtshülfe u. Gynäkologie, Bd. 14, Hft. 3, 1909; also Bd. 15, Hft. 2, 1909.

Bumm and Blumreich: Atlas, Wiesbaden, Bergmann, 1907.

Gauss: Münchener med. Wochens., p. 440, 1907.

Hofbauer: Monats. f. Geburts. und Gynäkol., Bd. 29, Hft. 2, 1908.

Meyer: Surgery, Gynecology, and Obstetrics, May 5, 1907.

Position of the Womb After Labor.—If recovery from labor is normal, the womb assumes a slightly anteverted position, arising in the abdomen until the fundus is near the umbilicus. It can be distinctly made out by palpation, its contractile portion firm and hard, while the lower segment and the stretched and torn surfaces in the cervix have fallen together. The stretched condition of the pelvic and vaginal tissues allows the cervix to descend into the pelvic brim, and if the urinary bladder be empty and a binder applied pinned from above downward, the fundus is carried forward, the uterus descends slightly into the pelvic brim, and pressure is thus made upon the uterine and ovarian arteries by the pelvic brim and tissues. As involution proceeds this position is maintained. Where, because of infection, hemorrhage, or prostration, the womb is not firm after labor, it may be retroverted or dilated by blood-clot, not assuming its anteverted position, and sinking backward and downward into the abdominal cavity.

Factors Producing Normal Involution and Return to Normal Position After Labor.—It is important that the obstetrician keeps in mind the essential factors producing a return of the birth-canal to its normal condition after labor.

First in importance is the absence of infection. In septic metritis the uterine muscle does not contract properly, the womb remains large and flabby; if the infection be severe, the canal is softened and the uterus is very readily perforated, infection extending to the broad ligaments and the tissues about the cervix, causing the cervix to assume an unnatural position producing displacements. When the patient recovers from acute infection, exudates and adhesions may permanently alter the position of the womb.

Laceration of the birth-canal which is not adequately repaired is a most efficient factor in preventing a return to the normal condition of the birth-canal. Where infection follows laceration the results are worse than in uncomplicated cases.

The general vigor or lack of strength in the patient, her ability to nurse the child, the care which she receives during the puerperal

period, the avoidance of constipation, all the conditions which bring about a prompt return to health, are most potent in producing a good recovery from labor. It must not be forgotten that abdominal pressure by improper clothing may produce displacement of the womb in cases which have been normal until ordinary clothing was resumed.

Bibliography

Alvensleben: Zentralblatt f. Gynäkologie, No. 36, 1908.
Burkhard: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 51, Heft 1, 1904.
Flint: American Journal of Obstetrics, January, 1908.

Bladder and Rectum During and After Labor.—As the presenting part descends into the pelvis, if the child fits tightly and disproportion be present, the neck of the bladder is pressed down between the presenting part and the symphysis, its mucous membrane becomes congested, and blood may be present in the urine. This is seen in cases of contracted pelvis, where the patient is for some time in ineffectual labor before assistance is rendered. The obstetrician should remember to invariably employ a catheter in all cases before operating. Bloody urine is a sign of prolonged labor with disproportion and excessive birth pressure.

The rectum is also subjected to pressure in cases where disproportion exists and the discharge of the child is difficult. During prolonged labor the mucous membrane will become everted at the anus, and hemorrhoids, if present, will become greatly distended. A rectum impacted with hardened feces is an obstacle to the descent of the child, and hence the invariable rule that both bladder and rectum should be emptied before undertaking an obstetric operation.

The Abdomen During Pregnancy.—As the operator may be called upon to perform abdominal section during pregnancy, it is well to keep in mind the anatomic relations.

As the womb grows and extends upward the intestines will be pushed upward and toward the sides. The degree of intestinal distention will depend not only upon the mechanical pressure, but also

upon the toxemic condition of the patient. Headache and intestinal toxemia are often accompanied by the formation of large quantities of gas. In these cases the transverse colon may become so distended as to obscure the palpation of the fundus and render a diagnosis of the size of the uterus difficult. The stomach may also be distended, and both stomach and intestines will cause excessive tympany and may obscure the recognition of fetal heart sounds.

If the patient has had general prolapse of the abdominal viscera, this condition will be partly removed by pregnancy. A prolapsed and floating kidney will be pushed upward as pregnancy advances to term. A dislocated spleen has in some instances been pushed upward, while in other cases it has been found low in the abdomen. The appendix vermiformis may be drawn upward as the womb rises if adhesions have been present between the appendix and surrounding tissues. In some cases it is pushed downward to or below the brim of the pelvis by the pressure of the womb above. Except in very fat patients, the abdominal wall becomes greatly thinned in pregnancy, and in prolonged labor the bladder is drawn strongly upward, and may be opened by the operator's knife in performing abdominal section, if caution is not observed. The abdominal viscera are unusually full of blood, the peritoneal tissues congested, and, in prolonged labor, fluid is found in the peritoneal sac.

Bibliography

Bumm and Blumreich: Account of Frozen Section, Weisbaden, J. F. Bergmann, 1907.
Fellner: Zentralblatt f. Gynäkologie, No. 22, 1906.
Füth: Archiv f. Gynäkologie, Band 76, Heft 3, 1907.
Heil: Archiv f. Gynäkologie, Band 81, Heft 1, 1907.

THE CONDITION OF THE BIRTH-CANAL REGARDING ASEPSIS

After prolonged discussion concerning the presence of bacteria in the birth-canal during pregnancy, the following conclusions seem to have been established by the majority of observers: In a healthy patient bacteria are found in greater or less abundance in the vagina,

and especially about its entrance during pregnancy. Streptococci, staphylococci, the Bacillus coli communis, the pneumococcus, and lower forms of bacteria of lesser virulence may be present in perfectly healthy individuals. These bacteria may enter the cervix, but ordinarily do not pass within the uterine cavity or between the membranes and the wall of the womb. In spontaneous parturition the movement of the uterine contents is from above downward, and the tendency is to sweep bacteria out of the vagina rather than into the uterus. During pregnancy the patient is protected from vaginal bacteria by the vaginal mucous secretion, which is somewhat germicidal, by the integrity of the vaginal mucous membrane, and the resisting quality of the blood. After labor, bacteria may ascend into the empty uterus, and often do so in cases presenting no abnormal symptoms. Even under such circumstances, if the womb be tightly contracted, the patient sound physically, and her blood in good condition, infection may not develop.

When, however, bacteria are carried into the uterus as an accompaniment to prolonged interference with the introduction of the hand and instruments, with laceration of the cervix and wounding of the endometrium, they produce infection. This is especially apt to happen in cases where fruitless efforts are made at delivery, with more or less pause between these efforts. In operations properly performed and promptly completed, although bacteria may enter the uterus at the time of operation, if the womb be left tightly contracted without accumulation of blood-clot or retained placenta, the conditions are not favorable for their development.

In cases where infections occur in the pelvic floor or vagina, bacteria ascend within the womb; if, however, the uterus be tightly contracted they often produce no symptoms and do no harm. Laboratory research and clinical observations lead us to believe that it is not merely the presence of bacteria in the vagina or uterus which is most dangerous to the patient, but the bruised and necrotic condition of the tissues following difficult extraction and prolonged labor, and the anemia of the mother resulting from hemorrhage and exhaustion.

These considerations suggest the question, "What shall be done to prepare the birth-canal for obstetric operations?" Shall an effort be made by vigorous antisepsis to remove all bacteria, giving the operator a sterile field for his operation? Clinical experience shows that, while this may theoretically be desirable, it is not practical. Accumulated secretions harboring bacteria and blood-clot should be removed before obstetric operations in the gentlest manner possible, and with antiseptic agents which do not cause necrosis of the vaginal epithelia. In place of vigorous rubbing with cotton or gauze, a copious but gentle douche, with a mild alkali combined with an antiseptic, gives the best result. In prolonged interference, as in induced labor, ascent of bacteria into the womb may be hindered by tamponing with iodoform gauze. In view of the constant presence of bacteria in the vagina and about the cervix, lacerations occurring during labor should be closed as promptly as possible.

The presence of preëxisting infection, as gonorrhea or syphilis, renders the birth-canal septic for purposes of operation. In such cases every care must be taken to interfere as little as possible with the interior of the womb, and to leave the uterus in such condition after operation that the spread of infection will be minimized.

Bibliography

Brünings: Monatsschrift f. Geburtshülfe und Gynäkologie, p. 533, 1900.
Bugelsdorff: Archiv f. Gynäkologie, Band 78, Heft 3, 1906.
Conrad: Beiträge f. Geburtshülfe u. Gynäkologie, Bd. 13, Hft. 3, 1909.
Fritsch: Deutsche m. Wochen., No. 8, 1909.
Gottschalk: Zent. f. Gynäkologie, p. 1611, 1909.
Higuchi: Archiv f. Gynäkologie, Bd. 86, Hft. 3, 1909.
Hofbauer: Monatssch. f. Geburts. und Gynäkol., Bd. 29, Hft. 2, 1908.
Hofmeier: Zent. f. Gynäkologie, p. 1493, 1909.
Jung: Zeitschrift f. Geburts. u. Gynäkol., Bd. 64, Hft. 3, p. 505, 1909.
Kehrer: Monatssch. f. Geburts. und Gynäkol., Bd. 89, Hft. 3, 1909.
Perry: L'Obstétrique, January, 1907.
Pfeilsticker: Gyn. Rundschau, p. 440, 1909.
Sticher: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 44, Heft 1, 1900.
Zweifel: Archiv f. Gynäkologie, Band 86, Heft 3, 1908.

CONDITIONS PREVENTING AND CONTROLLING HEMORRHAGE IN NORMAL LABOR

Obstetric operations, like other surgical procedures, are dangerous because of the possibility of the occurrence of hemorrhage, septic infection, and shock. In the delivery of the fetus the greatest importance may be ascribed to the presence or absence of uterine contractions. In cases of profound inertia, where the fetus is forcibly removed, violent hemorrhage often follows. The delivery of the child during uterine contractions not only does not produce hemorrhage, but brings about a prompt and permanent contraction of the uterus. As uterine contraction is a most efficient means of preventing hemorrhage, obstetric operations should, if possible, be performed while the uterus is active. Should inertia be present, stimulation should first be resorted to to produce uterine action before the fetus is removed.

In spontaneous parturition, hemorrhage is prevented by the descent of the lower portion of the womb into the pelvic brim, causing pressure upon the blood-supply of the uterus. Hemorrhage is also prevented by the condition of the patient's blood, which, in the absence of anemia, stimulates the uterine muscle to contraction and maintains a tonic condition in the nervous centers. In usual labor the absence of dangerous lacerations prevents extensive hemorrhage. The absence of infection is also a potent safeguard against the development of hemorrhage.

If the operator would avoid hemorrhage, he must secure uterine contraction, both during his operation and afterward; he must stimulate not only the uterine muscle, but the nervous system of the patient, as indications arise, and be prepared to repair lacerations causing hemorrhage as soon as possible. As in other branches of surgery, his constant endeavor will be to avoid infection.

Bibliography

Carmichael: British Medical Journal, February 24, 1906.

Dietzmann: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 17, Heft 3, 1903.

Fellner: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 16, Heft 5, 1902.
Ferroni: Annali di Ostetricia, No. 10, 1899.
Füth: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 51, Heft 2, 1904.
Given: Journal of Obstetrics of the British Empire, April, 1906.
Henderson: Journal of Obstetrics of the British Empire, February, 1902.
Hermann: British Medical Journal, June 16, 1906.
Marshall: British Medical Journal, May 2, 1903.
Sachs: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 1.
Savare: Annali di Ostetricia, No. 11, 1904.
Schroeder: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 17, Heft 5, 1903.
Sfameni: Annali di Ostetricia, November, 1899.
Zangemeister: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 49, Heft 1, 1903.

THE PREGNANT WOMAN AS A SURGICAL PATIENT

Pregnancy was formerly considered, if not a positive contraindication, an unfavorable condition for surgical procedures. Experience has shown that this view is an exaggerated one, and that it is possible to perform surgical operations of magnitude upon pregnant patients with satisfactory results.

Among the conditions which often render pregnant women bad subjects for surgical interference the most important is the toxemia of pregnancy. In proportion as this is severe, hemorrhage after an operation may be uncontrollable, shock will develop rapidly, anesthesia may be followed by overwhelming toxemia, and the reaction of the patient is very feeble. Before operating, surgeons should examine a pregnant patient carefully to determine the presence or absence of toxemia. The ordinary examination of the urine is not decisive in such a case. A twenty-four-hour specimen should be obtained, and, if possible, in addition to other examination, a nitrogen partition should be made. If there is a prolonged toxemia during pregnancy the patient will be anemic, with altered pulse tension and a good subject for hemorrhage.

The nervous system of the pregnant patient is in a more or less excitable condition, and this is especially seen in the tendency to emptying of the uterus. If this be prevented the pregnant patient will usually recover well after operation.

Anesthesia for surgical operations during pregnancy requires especial care because the enlarged uterus makes respiration difficult, and there is a constant tendency to pulmonary congestion and to overburdening the right heart.

Where, however, the pregnant patient is not toxic, is not fat, with good circulation and normal blood tension, and without bronchial irritation, she will endure surgical procedures in a very satisfactory manner. If the emptying of the uterus be prevented her recovery from operation is usually satisfactory.

Bibliography

Christ: Zentralblatt f. Gynäkologie, No. 16, 1901.
Joubert: Thesis, Paris, No. 317, 1906 and 1907.
Marschner: Zentralblatt f. Gynäkologie, No. 38, 1902.
Neu: Archiv f. Gynäkologie, Band 80, Heft 2, 1906.
Schauta: Zentralblatt f. Gynäkologie, No. 25, 1906.
Thring: British Medical Journal, January 9, 1904.

OBSTETRIC ANESTHESIA

Anesthesia for obstetric operations should be conducted with the same care which is given to the administration of anesthetics in other surgical procedures. The careless and inefficient way in which anesthetics are given in many confinements has had much to do with some of the obstetric disasters which occasionally occur. It is true that obstetric practice is conducted under unusual difficulties, from its irregularity, and from the fact that so little of it can be done in hospitals; but more patients are confined in hospitals than was formerly the case, and careful operators are accustomed to take with them to private houses competent anesthetizers.

An anesthetizer for obstetric operations must be competent to use ether and chloroform. It will be well if he has had experience with ethyl chlorid and nitrous oxid. Anesthesia by lumbar injec-

tion is not at present practised extensively in private houses and should be reserved for hospitals.

All labors should be so conducted that the patient is in proper condition for anesthesia during delivery. During labor the patient should take only broth or gruel, or raw egg made palatable. Milk should be avoided, as the excitement and pain of labor delays its digestion and absorption. In view of the possibility of anesthesia, the patient's general strength should be sustained, and she should be brought to the active stage of labor in good condition for an anesthetic.

In selecting the anesthetic for an obstetric operation, choice will depend upon the operation to be done and the circumstances present. In all cases where it is not necessary to relax the uterus to change the position of the child, ether should be employed. In shoulder presentations, where the uterus is tetanically contracted and it is desired to relax it to permit version, chloroform should be given during version, followed by ether during extraction. For short manipulations, where it is necessary to carry the hand or instruments within the uterus, as in placing elastic bags, chloroform may be used well diluted with air.

In the great majority of cases ether is the better anesthetic, being safer and giving better results.

I have recently tried ethyl chlorid in short manipulations and normal labor. Its action was disappointing, although it was given by one accustomed to its use in general surgery. Uterine contractions grew less under its use, and there was a greater tendency than usual to relaxation and hemorrhage.

In hospital practice, and with highly nervous patients, brief manipulations may be done with nitrous oxid.

The Administration of Ether.—Ether is most usually given in obstetric practice for forceps operations, extraction by the breech, embryotomy, opening of the pubes, delivery by abdominal section, and the repair of lacerations. None but the best quality of sulphuric ether should be used. The anesthetizer should have ready

instruments for opening the mouth, pulling out the tongue, giving hypodermic injections, and intravenous saline transfusion. If the patient is shocked or depressed, or has heart lesions, oxygen should also be available. Obstetric operations should be done with the patient across a high, narrow bed, or placed upon a table where the anesthetizer can work without difficulty. The low, broad bed is an abomination for all obstetric procedures. In commencing ether the anesthetizer must endeavor in cases of vaginal delivery to stimulate uterine contractions by the anesthetic. If ether be inhaled in small quantities with each uterine contraction, the inhibitory influence of pain is removed and uterine contractions are usually more efficient and vigorous. As the patient's respiratory capacity is lessened by the enlarged womb, she should take ether gradually, avoiding irritation as much as possible. If the operation is to be a very long one, oxygen may be inhaled with the ether. Care should be taken that the patient lies in the best possible position, so that mucus can readily be expelled, and the anesthetizer should keep the mouth and throat as free from mucus as possible. As the patient proceeds to complete anesthesia, in forceps deliveries and breech extractions, the operator may desire assistance from the anesthetizer in stimulating uterine contractions or pressing the child downward into the pelvis. Complete surgical anesthesia is usually necessary when the child passes over the pelvic floor. Incomplete anesthesia at this time results in reflex struggle, which embarrasses the operator and favors the production of lacerations.

As soon as the child is delivered the anesthetic should be removed, and the patient allowed to come into the stage of light anesthesia. She should be maintained in this condition during the delivery of the placenta, and, if possible, during the closure of lacerations. If necessary, the anesthesia may become more profound if the patient struggles.

A marked change in the respiration and the pulse tension of the patient will be observed when the uterus is empty. The anesthetizer

should be prepared for this, and, if necessary, should give stimulation hypodermically at this time. A skilled obstetric anesthetizer should assume entire charge of the patient's vital condition during operation, greatly to the advantage of the patient and the relief of the operator. At the close of an obstetric operation, if the patient is in bad condition, the anesthetizer should give such stimulation as is necessary, including intravenous saline transfusion.

Experience has shown that during obstetric operations patients bear well strychnin and digitalis hypodermically. If bronchial catarrh is profuse, atropin may be added. As soon as the uterus is empty, ergot should be given hypodermically. Intravenous saline transfusion in moderate quantity is also useful. If the blood-pressure be very low, adrenalin (1 : 1000) may be added to the saline fluid injected into the vein.

Anesthesia by Chloroform.—In giving chloroform to obstetric patients none but the best chloroform should be selected, and this should be given freely diluted with air.

Where bronchial complications are present, chloroform diluted with oxygen is of especial value. For brief manipulations, which require partial dilation of the uterus, chloroform is valuable, while it is especially useful in cases of threatened uterine rupture and shoulder presentations where version must be done.

While complicated masks are useful in the hands of those familiar with them, in general, chloroform is most safely given upon a handkerchief or piece of gauze, held from 1 to 2 inches from the patient's nostrils.

Great care should be taken in giving chloroform that the patient is completely relaxed before version or dilation of the uterus be attempted. The large number of deaths under chloroform anesthesia have occurred under partial anesthesia only. The depressing effect of the drug is present under such conditions, while the reflexes are not abolished. As a result, the patient is shocked by the painful reflex, and the heart, depressed by the chloroform, stops. The safe use of

chloroform requires that the patient be entirely unconscious, breathing deep and regularly, with good pulse and good color.

Where it is desired to administer oxygen gas with chloroform, an Allis inhaler or chloroform mask may be used, the tube from the oxygen tank being carried into the inhaler or beneath the mask. During the administration of chloroform the anesthetizer must watch the patient most closely, and, in the event of unfavorable symptoms, must stop the anesthetic at once, give strychnin and digitalis hypodermically, with the free administration of oxygen. As chloroform tends to relax the uterus, the anesthetizer must also watch for hemorrhage. As chloroform is rapid in its action, its administration must not be begun until the operator is ready to proceed, and it should be stopped as soon as possible.

Recovery from Obstetric Anesthesia.—After an obstetric operation, care should be taken that a patient makes a satisfactory recovery from the anesthetic. If she vomits, the mouth should be cleaned, and if vomiting is persistent, the stomach should be washed out. As vomiting often accompanies a relaxed condition, favoring hemorrhage, especial care should be taken to see that the uterus is well contracted. Tonic doses of strychnin hypodermically are most useful during the recovery from anesthesia. Food and water should be withheld until the patient is without nausea. If fluid is required it should be given by rectal injection.

Anesthesia by Lumbar Injection.—It was hoped that a great advance in obstetric anesthesia had been made when lumbar injection of preparations of cocain, morphin, and belladonna was introduced. This method has been sufficiently tried at the present time to enable us to form a fair estimate of its value. It has been most extensively practised in Germany, where Hocheisen quotes 2000 cases, with 25 deaths; Roith, 4000 cases, with 18 deaths.[1] Gauss[2] had good results in 500 cases. In Hocheisen's cases the method was ineffectual in 18 per cent., but this did not seem to depend upon the dose used.

[1] Monatsschrift f. Geb. u. Gyn., Band 59, Heft 1.
[2] Zentralblatt f. Gyn., 1907, No. 2.

In 65 per cent. the patients fell into a light sleep after anesthesia terminated. In 70 per cent. there were unpleasant after-effects, such as redness of the face and throat and thirst. In some cases the distress was so acute that it was thought unsafe to leave the patient without the care of a physician. In 24 per cent. the pressure of the abdominal muscles was distinctly lessened, as in 25 per cent. the use of forceps was necessary. The length of labor was increased, postpartum hemorrhage more frequent, 1 fatal case being reported; the placenta came away more slowly than usual, and involution was retarded. Disturbance in the pulse was observed in 20 per cent. Newell[1] has tried scopolamin morphin by lumbar injection, and his results agree essentially with those stated by German observers. With skilful administration it is possible to produce local anesthesia in a considerable number of cases, but the method is somewhat uncertain and requires constant and intelligent supervision. Gauss,[2] after a large experience with lumbar injection, advises injection into the subarachnoidian space with the patient in the sitting posture, and with the patient remaining in this posture four or five minutes after the injection. After this she may lie down, preferably with the pelvis raised. Stovain, an average dose of 0.07, in weak individuals reduced to 0.05, is administered. This dose should not be exceeded. Where transient and partial anesthesia is necessary, a smaller dose may be employed. The specific gravity of the injected fluid is important, and Gauss has determined this by observations upon the specific gravity of the cerebrospinal fluid. The lower the specific gravity of the fluid the more certain the efficiency of its anesthetic effect. In most cases 4 per cent. solution is most available. The choice between tropacocain, novocain, or stovain is not of especial importance. Gauss had good results in 1500 cases with stovain, and believes that success depends more upon the method of administration than the particular preparation employed.

[1] Trans. Amer. Gyn. Soc., vol. 31, 1906.
[2] Zentralblatt f. Gyn., No. 31, 1909.

Freund[1] has had good results with eucain-adrenalin; his solution is as follows:

℞.	Eucain,	0.1;
	Natr. chlorat.,	0.06;
	Solut. adrenalin., 10/00,	0.8;
	Aq. destillat.,	ad. 10.0.—M.

Of this preparation he gives the contents of two hypodermic syringes for operations of a half-hour or more. Fisch[2] employs novocain and suprarenin, and has had good results from this method. That combination most extensively employed has been scopolamin morphin. Gauss used scopolamin, 0.3075 with 0.01 morphin. Others have varied the amount of scopolamin slightly, the amount of morphin remaining practically the same. In general, it may be stated that considerable diminution of pains in parturition was observed in 6 per cent. of patients receiving lumbar injections. In about 30 per cent. labor was prolonged, and in the remainder no efficient result followed. A sufficient number of accidents by this method have been reported to lead to the conclusion that the method should be restricted to hospital practice only, where the patient is under constant observation, with all appliances for resuscitation. Those who think best of the method would apply it to anemic, cachectic, and fat patients.

The Effect of Anesthesia During Obstetric Operations Upon the Fetus.—Prolonged anesthesia during parturition affects the child. It breathes with more difficulty, is slower in reacting, and may be resuscitated with great difficulty. After lumbar anesthesia, abnormal conditions in the circulation and pupil, with abnormal respiration, have been observed. Under skilful anesthesia obstetric operations are performed with ether without detriment to the child, but, if anesthesia were not properly conducted, considerable fetal mortality and morbidity would result.

Surgical Narcosis in Women.—An extended review of this subject has been made by Roith.[3] He collected 98,939 cases of inhalation nar-

[1] Zentralblatt f. Gyn., No. 31, 1909. [2] Zentralblatt f. Gyn., No. 31, 1909.
[3] Monatsschrift f. Geb. u. Gyn., 1907, Band 26, Heft 1.

cosis and 11,692 cases of local anesthesia in the practice of 783 physicians. The complication most frequently following the inhalation of anesthetics in obstetric operations was pneumonia, which occurred in 3.4 per cent., with mortality of 7.5 per cent. Under local anesthesia the mortality from pneumonia was 4.8 per cent.; the morbidity 12.8 per cent.

In 87,530 anesthesias with chloroform there were 54 fatalities—1 in 683. In the majority of cases ether is safer than chloroform. A preliminary injection of $\frac{1}{8}$ gr. of morphin one hour before operation, followed by ether, has given good results. In 21,000 cases of inhalation anesthesia, unfavorable symptoms were seen in these more frequently with chloroform and its mixtures than with others. Complications are more frequent in winter than in summer. The tendency of ether to excite bronchitis is seen in the fact that, after the use of ether, bronchitis occurs once in 400 cases; after the use of chloroform, once in 3300. So far as safety is concerned, ethyl chlorid gave but 1 death only in 8500 anesthesias. In all, 22 deaths from ethyl chlorid have been reported, giving a mortality of 1 in 16,000; 5000 chloroform inhalations are reported with but 1 death, and 9289 ether inhalations without a death. Mixtures of anesthetics are more dangerous than one pure substance.

It is of especial interest to obstetricians to note the results seen after prolonged anesthesia in the production of acidosis and acetonemia. This is especially apt to occur after the use of chloroform, and develops in five days or more after the operation. Degeneration in the cells of the kidneys, liver, and connective tissues, in the heart muscle, and in the epithelia of the body are observed. The heart and liver are affected sooner than the kidneys. Chloroform, ethyl bromid, and ethyl chlorid are more apt to produce these changes than is ether. On the other hand, under prolonged etherization small areas of pneumonia are observed, with accumulation of mucus, extravasation of blood corpuscles, and cell infiltration in the surrounding tissues. Under all circumstances, anesthesia should be as brief as possible, and should not be repeated in from three to six days, if it

can be avoided. Fatty degeneration in the heart, kidneys, and liver contraindicates anesthesia. Where acetonemia develops after operation, the symptoms are vomiting, coma, and very active delirium. Every effort should be made to introduce alkalies into the body as extensively as possible, but results of treatment are seldom successful. Strychnin and caffein may be given hypodermically. In general, accidents following anesthesia may be in some degree prevented by disinfecting the mouth and pharynx with an antiseptic solution before anesthesia. A tonic dose of strychnin or digitalis, or strychnin and digitalis together, may be given hypodermically before anesthesia. In hard cases small doses of morphin are sometimes useful to allay the patient's apprehensive condition.

In heart failure during the operation, massage of the heart through the abdominal wound, if laparotomy is the operation, by manipulating the diaphragm, has given some success. The application of electricity and the injection of adrenalin should be tried. The injection of camphor or atropin, or strychnin and digitalis should be employed, and, rarely, tracheotomy and inflation of the lungs.

Anesthesia is especially dangerous in highly toxic patients and those depleted by hemorrhage. In operating during eclampsia the tendency to acetonemia should be remembered; such patients should be given salt solution as freely as the circulation will permit. In septic cases, with a tendency to hemorrhage, adrenalin is of use until the operation can be completed, when uterine bleeding may be controlled by packing.

A bibliography of the recent literature, with especial reference to spinal anesthesia, is appended.

Bibliography of Obstetric Anesthesia

Avarrfy: Gyn. Rundschau, p. 338, 1909.
Bass: Münchener med. Wochenschrift, No. 11, 1907.
Bertoni: La Ginecologia, vol. 4, p. 609, 1907.
Birchmore: Medical Record, January 17, 1907.
Buist: British Medical Journal, September 19, 1908.
Butler: American Journal of Obstetrics, August, 1907.

Croom, J. Halliday: Journ. of Obstetrics and Gynecology of the British Empire, July, 1909.
Dean: British Medical Journal, May 12, 1906.
Fehling: Zentralblatt f. Gynäkologie, p. 893, 1909.
Fisch: Zentralblatt f. Gynäkologie, No. 31, 1909.
Freund: Zentralblatt f. Gynäkologie, No. 48, 1904, and No. 31, 1909.
Gauss: Münchener med. Wochenschrift, No. 4, p. 157, 1907; Zentralblatt f. Gynäkologie, No. 2, p. 33, 1907, and No. 31, 1909.
Gminder: Beiträge f. Geburtshülfe und Gynäkologie, Band 12, p. 299, 1907.
Halpenny and Vrooman: American Journal of Obstetrics, Oct., 1909.
Hocheisen: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 1, 1907; Münchener med. Wochenschrift, No. 11, 1907.
Holzbach: Münchener med. Wochenschrift, No. 25, 1907.
Kalb: Monats. f. Geburtshülfe u. Gynäkologie, Bd. 30, p. 607, 1909.
Kleinertz: Zentralblatt f. Gynäkologie, p. 1387, 1907.
Kroenig: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 564, 1907; also Band 30, p. 518, 1909.
Lea: Journal of Obstetrics of the British Empire, January, 1902.
Mayer: Zentralblatt f. Gynäkologie, p. 689, 1907.
McKerron: Journal of Obstetrics of the British Empire, December, 1908.
Müller: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 21, Heft 2, 1905.
Newell: Surgery, Gynecology, and Obstetrics, July, 1906, August, 1907.
Preller: Münchener med. Wochenschrift, No. 4, p. 161, 1907.
Risch: Zentralblatt f. Gynäkologie, No. 30, 1909.
Roith: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 1, 1907.
Sellheim: Zentralblatt f. Gynäkologie, No. 26, 1905.
Steffen: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 589, 1907; Archiv f. Gynäkologie, Band 81, p. 451, 1907.
Stockel: Monats. f. Geburtshülfe u. Gynäkologie, Bd. 29, p. 378, 1909.
Stoeckel: Zentralblatt f. Gynäkologie, No. 1, 1909.
Stolz: Archiv f. Gynäkologie, Band 73, Heft 3, 1904.
Thomson: Zentralblatt f. Gynäkologie, No. 31, 1909.
Tobiaszek: Zentralblatt f. Gynäkologie, p. 1665, 1909.
von Bardeleben: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 59, p. 144, 1907.
von Franqué: Monats. f. Geburts. u. Gynäkol., Bd. 30, p. 615, 1909.
Wernitz: Zentralblatt f. Gynäkologie, No. 31, 1909.
Westermark: Archiv f. Gynäkologie, Bd. 89, Hft. 1, 1909.
Zulaf: Zentralblatt f. Gynäkologie, No. 20, 1902.

The Technic of Obstetric Surgery

OBSTETRIC OPERATIONS IN HOSPITALS

The Operating-room.—Maternity hospitals require several operating-rooms, which should be kept ready for use. Emergency labor cases sent to hospitals are always suspicious as regards their aseptic condition, and many have already been infected. It would be obviously unfair to operate upon them in a room which might immediately after be needed for a case which had been in the ward sufficiently long to be known to be uninfected. If possible, each operating-room should have a separate sterilizing outfit and a separate water supply, so that, if necessary, several operations may proceed simultaneously, as confinements occur often in groups. These rooms should be of convenient size, properly lighted and heated, with seats or standing room for students, in teaching hospitals. In such operating-rooms the space utilized for operations may be shut off from spectators by a heavy glass screen, permitting vision, but preventing, as far as possible, contamination.

Operating Tables.—For operations requiring vaginal delivery a high, firm table should be selected, to which may be fitted, if desired, supporting stirrups for the feet and legs. Their use will economize the work of nurses, and is usually convenient for the operator. Such tables should stand firmly, and should be sufficiently high to enable the patient to be put in Walcher's position. A high table will also be found convenient in permitting the operator to stand during the performance of forceps extraction, version, and craniotomy, For abdominal section a suitable table is needed with an attachment for the complete Trendelenburg position. This may be necessary in ruptured ectopic gestation, in removing tumors complicating pregnancy and situated at the bottom of the pelvis, and in other conditions requiring exploration of the deeper tissues in the pelvic

cavity. The Trendelenburg position will also be useful in some cases of severe shock and hemorrhage, as in rupture of the uterus.

Sterilizing Apparatus.—The autoclave or other sterilizing apparatus may be employed, but it should be so arranged that it can be used at a moment's notice at any time, day or night. The source of heat must be under the control of the nurses in charge of the operating-room, and must not be derived from a central plant. As obstetric operations must often be done at night, there must be no delay in securing the necessary heat. The sterilizing apparatus should have sufficient capacity to sterilize sheets and blankets as well as dressings and instruments. Whenever possible, sterilization should be by steam, followed by dry sterilization as well.

The Sterilization of Obstetric Instruments.—Many of these are larger than other instruments used in surgery, and will require sterilizing trays or pans of suitable size. Obstetric instruments may be boiled in 1 per cent. lysol without doing other injury than dulling the cutting edges of the knives. Some operators prefer to have the forceps and other obstetric instruments remain in a sterilizing pan covered with antiseptic fluid. Lysol is convenient for this purpose, as it renders the forceps sufficiently slippery for introduction without other lubricant. Others prefer to use instruments which have been dried and then laid upon a table covered by sterile gauze or linen. Some obstetric instruments are composed of a number of parts, such as the obstetric trephine and basiotribe, and these should be taken apart, thoroughly scrubbed with soap and soda and hot water after use, and then boiled in lysol and dried. Before operation they should be thoroughly inspected, and if not clean, the cleaning should be repeated and the instruments boiled and thoroughly sterilized before the parts are put together.

Bougies for the introduction of labor cannot be sterilized by heat. They must be thoroughly washed with soap and water, rinsed in sterile water, and soaked in bichlorid solution (1 : 1000). Dilating bags may be boiled, although this process injures the elasticity of the rubber and causes the bag to deteriorate. They should be filled,

at least partially, with fluid before boiling, and should be thoroughly tested and inspected to see that no leak is present. After sterilization they should be kept in an antiseptic solution until used. Obstetric instruments require sterilization for at least half an hour, and, when time permits, the instruments and appliances to be used at an obstetric operation can be sterilized for one hour with advantage. Rubber gloves should be sterilized by boiling, then dried, the fingers packed with sterile gauze, and the gloves powdered with sterile talc powder and wrapped in sterile gauze. Many operators prefer to put them on in the dry condition. Others prefer to fill them with an antiseptic solution.

Antiseptic Fluids.—Bichlorid of mercury in solution (1 : 2000) is employed by many for cleansing the external genital organs. Where vaginal douching is required, bichlorid solution should not be stronger than 1 : 4000. For preparing the vagina for vaginal operations in cases already infected sterile soapsuds may be used as a preliminary injection, and the vaginal mucous membrane may be thoroughly washed with sterile soapsuds and gauze. A copious douche with sterile boiled water should then be given, followed by bichlorid solution (1 : 4000) or lysol (1 per cent.). Carbolic acid in 2 per cent. solution is used by some for the sterilization of instruments, but its use has been largely superseded by lysol. Where uterine irrigation is required, sterile salt solution or lysol (1 per cent.) is usually employed.

In maintaining asepsis about the nipples a saturated solution of boric acid is usually employed, and also in the aseptic care of the infant. In the prophylaxis of ophthalmia, nitrate of silver, 10 gr. to the ounce, or 20 per cent. solution of argyrol, are usually required. Among English obstetricians a port-wine-colored solution of tincture of iodin in sterile boiled water is sometimes used for irrigating the uterus. For intra-uterine injections in septic cases a 1 per cent. formalin solution has been employed.

Obstetric Instruments.—Such should be of the best quality, thoroughly nickel-plated, and free from dirt and rust. The instru-

ments should be carefully cleansed after each operation, boiled in lysol solution (1 per cent.), and dried. This should be repeated before their use. The rubber handles formerly used in the forceps have been discarded by most manufacturers, and metal handles substituted. If the rubber handle is of first-rate quality, it may be utilized indefinitely without injury; but if it be of the cheaper sort, repeated sterilization will injure the rubber.

Such are the emergencies of obstetric practice that, in preparing for vaginal delivery, it may be necessary to have in readiness not only the forceps, but instruments for embryotomy as well. There should be a number of good hypodermic syringes in good order, an electric battery for resuscitation, and instruments suitable for intravenous transfusion. An independent source of light is most important in obstetric operations, and a portable electric drop-light is especially useful. Such may be focused upon the perineum and pelvic floor or into the abdominal cavity.

The Asepsis of the Operator.—Obstetricians, whether in hospital or private work, should avoid sources of septic contamination. They should not make autopsies or study pathologic specimens, and should avoid, as far as possible, contagious diseases. After operating upon a septic case a thorough bath and an antiseptic bath should be taken, with thorough shampooing of the head and a complete change of clothing. In operating, street clothing should be discarded and sterile linen or duck worn in its place. If necessary, a clean rubber apron may be worn beneath a sterile gown.

Before operating, the operator requires suitable clothing—a sterile gown whose sleeves reach easily to the wrists, an antiseptic covering for the head and hair, and, for all cases of section, a face mask as well. Gloves should be worn, and the gown sleeves folded snugly at the wrists and covered by the wrists of the gloves.

In cleansing the hands, the operator may select any of the methods which have given practical satisfaction. That most usually employed consists in trimming the nails smoothly, cleaning them thoroughly with an orange-wood stick, and scrubbing the hands, wrists,

and forearms, including the lower portion of the arms, with green soap, or tincture of green soap and hot water, for at least fifteen minutes; after this, thorough scrubbing in hot sterile water. This should be followed by a thorough cleansing with bichlorid solution (1 : 2000). A thorough application of 95 per cent. alcohol, and drying with a sterile towel, should precede the putting on of the gown and gloves. The hands should be heavily powdered with sterile talc to prevent, if possible, undue perspiration.

Some prefer the use of permanganate solution and oxalic acid in cleansing the hands, and others prefer the hypochlorid of lime paste, followed by sterile water and bichlorid.

Obviously, the operator's success in asepsis will depend not only upon his preparations, but upon his avoidance of non-sterile articles during operation. No matter what emergency may arise, he must form such habits that he will not be led to violate aseptic precautions.

Should an operator become infected, he cannot safely do obstetric operations until the focus of infection has entirely healed, and he has had sufficient time to disinfect as carefully as possible. The operator having a septic focus of any sort in the body is a source of danger to his patients.

The Preparation of the Patient.—In obstetric hospitals patients may be prepared for abdominal section by any of the methods employed in good surgical hospitals. Each operator should select certain things which he deems essential, and the obstetrician should have printed directions for preparation, and the nurses and assistants should follow them strictly. From the nature of the case there is often not so much time to prepare an obstetric patient for operation as is available for other surgical cases. Hence, the obstetric preparation should be especially thorough and careful. In scrubbing the abdominal surface and in cleansing the external genital organs green soap in solution is especially useful. The parts should be shaved, and after the use of the soap they should be thoroughly irrigated with hot sterile water. Bichlorid solution (1 : 2000) may then be employed, followed again by sterile water. A moist bichlorid

dressing (1 : 2000) may be placed upon the abdominal surface or over the vulva until the moment of operation.

In preparing suspected cases for vaginal delivery we have found useful a mixture of green soap in paste, lysol, and hot sterile water. If preferred, the tincture of green soap and lysol may be used. Before vaginal operations the region about the anus and that of the urethra should receive especial attention, and, if there be time, the rectum may be thoroughly irrigated with salt solution. The bladder should be catheterized just before the operation, preferably when the patient is anesthetized. It is well to prepare an arm for intravenous saline transfusion in cases where the operation may be prolonged, and where the patient is not in good condition.

Preparation for the Care of the Infant in Hospitals.—After difficult obstetric operations, infants are frequently born partially asphyxiated and sometimes suffering from birth pressure. Such require not only prompt attention, but especial care during the next few days. Portable incubators should be in readiness, so that such a child may be kept thoroughly warm from the moment of birth and transferred in an incubator to the nursery of the hospital.

In the event of wounds or injuries to the fetus, the usual appliances for aseptic cleansing and dressings will be needed.

Suture and Ligature Material.—In an obstetric hospital a complete assortment of silk, catgut, and silkworm-gut should be in readiness. If possible, the silk should be freshly boiled before each operation. Catgut should be prepared to last in the tissues at least two weeks, and any reliable brand fulfilling this indication may be selected. It is often safer to have the hospital nursing staff prepare the catgut than to trust to manufactured varieties. Iodized catgut as prepared by the nurses of the Jefferson Hospital, has given, in our hands, excellent results. Nos. 1 and 2 are most usually employed. Silkworm-gut should be of the best quality and the largest obtainable.

In closing lacerations of the perineum the smaller and thin silkworm-gut cuts the tissues and is not strong enough.

The Cleaning and Fumigation of Operating Rooms.—Rooms used for obstetric operations should have walls and floors capable of being thoroughly washed and fumigated frequently. If metal or tile is not available in construction, and ordinary materials be used, the employment of enamel paint, frequently applied, will enable those in charge to wash and fumigate the walls as often as necessary. The washing should be done with a strongly alkaline soap, followed by rinsing with boiled water, and the fumigating may be advantageously performed by vapor of formaldehyd. All articles used in such an operating-room which cannot be boiled should be included in the fumigation. The fact that formaldehyd does not injure metals and fabrics has caused it to supersede sulphur as a fumigating agent.

Some prefer, in addition to cleansing with soap and water, to have the walls and floors thoroughly washed with bichlorid solution (1 : 1000). This injures the metal finishing and, if used in excess, may result in irritation to those who use the room. Operating-rooms should have a bountiful supply of sunlight, and should be kept well aired and illuminated by the sun when not in use. The source of heat should be such that dust will not be brought into the room by flues or ventilators. It should be possible to raise the temperature of such operating-rooms to 75° or 80° F. whenever occasion demands.

TO CONDUCT OBSTETRIC OPERATIONS IN PRIVATE HOUSES

With the appliances of a well-found hospital obstetric operations may readily be conducted under the same precautions which have made general surgery so successful, but many obstetric patients must be delivered in their homes, and here the problem of maintaining and practising antisepsis becomes more difficult.

The Confinement Room.—Whenever possible, a room should be selected for confinement into which no drain opens, which has an open fireplace, and a free exposure to sunlight and air.

No room in which an infectious or contagious disease has oc-

cured should be selected for confinement. Curtains, carpets, and upholstered furniture should be removed if it can possibly be done. The floors should be thoroughly scrubbed with a strong alkaline soap, and if rugs are desired they should be thoroughly cleansed or fumigated before use. Whenever possible the source of heat should be an open fire or hot-water heating, and furnace flues should not communicate with the room. It should be on the same floor with the bathroom or water supply and toilet-room, and, if possible, in a quiet part of the house.

The Selection of Beds and Tables.—For the more serious obstetric operations a suitable operating table should be taken to the house, and, if this is not convenient, an operating table must be improvised. An ordinary clean kitchen table answers the purpose well, suitably covered with a clean blanket and clean linen, with the addition of a rubber pad for drainage. Several other small tables, thoroughly cleaned, may be covered with sterile linen and used for instruments, basins, pitchers, dressings, and other needed articles.

It is sometimes difficult to obtain a suitable table, and some patients are greatly frightened at the idea of being placed upon a table for delivery. If a narrow, high, single bed can be procured, with one or two firm hair mattresses, this will serve for forceps delivery, the delivery of the placenta, and the closure of lacerations. It should be raised sufficiently high for the convenience of the operator. An iron hospital bed, if possible, should be procured, and this may be raised on four cubical blocks, 8 inches in diameter, to a convenient height. Such a bed raised upon blocks will be found most convenient for any illness, and so may be kept in the family to advantage after the confinement. The mattress may be so protected with rubber sheeting, with the help of a rubber pad, that it will not become soiled, and instrumental delivery can be accomplished in many cases in a satisfactory manner. For the use of Walcher's position, the performance of version, opening the pelvis, craniotomy, or opening the abdomen a table will be found necessary.

Where it is impossible to remove old carpet from the floor, the

nurse may spread over the carpet, beneath and about the patient's bed, old linen which has been boiled, dipped in bichlorid solution, and dried. This will prevent the dust from the carpet infecting the patient.

Water Supply.—The water supply in many private houses may become a source of infection, and corresponding precautions must be taken. Water used during confinement, and especially during obstetric operations, should be thoroughly boiled. It is well, if possible, to use filtered water, and by some distilled water is preferred. A copious supply of hot water must be available in preparing for operations, and during and after the operation itself.

Appliances for Operation in Private Houses.—If possible, the obstetric nurse should procure an abundant supply of agateware basins and pitchers, or cheap china basins and pitchers, before the confinement. These can be scrubbed and cleaned thoroughly, and, if possible, boiled, without fear of great loss should breakage occur. Agateware utensils are useful in a household at any time. As irrigation may be required, a new fountain syringe should be procured, and this should be boiled before it is used.

Methods of Sterilization in Private Houses.—An Arnold sterilizer will often be found useful, and in communities where the operator must improvise hospital facilities himself he may find it more satisfactory to use his own than to trust to the domestic utensils of the patient. If a sterilizer cannot be procured, a thoroughly clean wash-boiler may be used, and linen and other needed supplies prepared in that. A new, clean fish kettle is also a convenient utensil.

The obstetrician, however, must have his own independent apparatus for sterilizing his instruments, gloves, and appliances. Some prefer to have the sterilizing done at the obstetrician's office, the various instruments wrapped in sterile linen and tagged, and thus carried in a sterile and dry condition.

In the writer's experience it has seemed best to sterilize instruments and appliances just preceding their use, having them kept in a thoroughly clean condition when not in use. We employ to our satisfaction a double copper nickel-plated box, the smaller fitting into the

larger half, which serves as a cover. This is sufficiently large to contain many obstetric instruments, and the instruments may be carried in this sterilizer with gloves and other supplies. Two supports and two alcohol lamps furnish a convenient and efficient source of heat. To prevent danger of fire from the use of alcohol, we are accustomed to place the sterilizer on the bottom of an empty bath-tub, boiling its contents in 1 per cent. lysol for at least half an hour. The sterilizer need not be opened until the instruments are required; the larger half inverted gives an additional sterile tray for the division of the instruments into convenient groups. Silk and silkworm-gut may be conveniently boiled with the instruments, and catgut in tubes may be reheated when the instruments are sterilized.

The obstetrician will also carry with him a rubber pad, an outfit of sterile operating clothing, a rubber apron, gauze for packing the uterus, a sufficient supply of antiseptics to serve in any emergency, hypodermic syringes, and such drugs as are necessary for the relief of pain and for stimulation in all surgical cases. Such supplies may be conveniently packed in a suitable case or bag. For out-of-town practice, if a number of these outfits are kept in readiness, one may be sent in advance to the house of the patient, greatly to the convenience of the operator.

Surgical Dressings.—Where strict economy need not be practised, aseptic bichlorid, iodoform, or borated gauze or cotton can be obtained in sealed packages. If the patient must economize, the nurse who is in charge of the case should have in readiness a supply of sterile vaginal dressings, abdominal binders, breast-binders, sheets, towels, and sterile linen for the patient's use.

It is well to select plain underclothing, and that which can be torn, if necessary, without occasioning much loss. The obstetrician should furnish the patient in advance a list of such antiseptics, stimulants, and other articles which should be kept in the house, and the nurse should see that all is in readiness before the time of confinement.

Cheap but efficient vaginal dressings can be prepared by selecting the cheaper grades of cheesecloth, boiling them in soda and water

to render them soft, soaking them in bichlorid solution and drying, and including in the dressing the cheaper grade of cotton batting, the whole being sterilized by baking. These may be wrapped in sterile linen or a sterile towel and properly labeled. The invariable rule after obstetric operations must be that all soiled dressings are to be burned as soon as possible after their removal.

For maintaining asepsis in the infant, very soft old linen sterilized by boiling is especially useful. For ligating the umbilical cord, the operator may employ surgeons' silk boiled with the instruments. As the birth may possibly be precipitated before his arrival, the nurse should also prepare sterile ligature material.

Many patients are comforted to have in readiness a supply of ether. The most request its administration for spontaneous birth and for minor surgical procedures. The operator or his assistant should have a sufficient supply of anesthetics for each case.

ASSISTANTS FOR OBSTETRIC OPERATIONS

The time is fortunately past when the obstetrician is expected to anesthetize the patient himself, give the anesthetic to a friend or relative, and then proceed to perform the operation. The obstetric anesthetizer should not only administer the anesthetic, but he should have experience in treating parturition and be competent to stimulate the uterus to contraction during delivery, and to watch its condition after it has been emptied. The administration of anesthetics and assisting in obstetric operations cannot be undertaken properly by surgical anesthetizers or by unskilled physicians. Complications frequently arise at confinement where skill and experience are necessary for mother or child, or for both, at the same time. Hence the service of two obstetricians is demanded for these cases.

In addition to a competent obstetric anesthetizer, we have found it advantageous to have a special obstetric nurse at confinement cases, who has charge of the instruments and supervises the conduct of the operation. In every case requiring interference there is abundant work for two nurses.

Daniel Walden, M.D.
336 Centre Street
Jamaica Plain, Mass.

No surgeon would think of undertaking operations as difficult as those of obstetrics without suitable appliances and assistants, and it is unjust to both patient and obstetrician that similar precautions should not be taken in difficult delivery.

After difficult delivery, if the mother be exhausted, especial care must be taken in her nursing during the first few days of the puerperal period. The services of two nurses will be required, as after any other critical surgical procedure.

Obstetric Nursing.—While most training schools give instruction in obstetric nursing, yet many do not become proficient in this branch, and are not competent for operative work in obstetrics. Competent obstetric nurses must thoroughly understand the signs and symptoms of exhaustion, hemorrhage, and beginning infection. They must be competent to conduct a rapid spontaneous delivery in an emergency, and must be taught how to employ Credé's method of placental expression should this be necessary. They must be competent to treat postpartum hemorrhage, excepting tamponing the uterus. They should also understand the essential treatment of asphyxia in the newborn and the simple methods of checking hemorrhage from the umbilicus.

The signs and symptoms of threatened eclampsia should be impressed upon their minds. The obstetric nurse must have the same conscientious habits of cleanliness and accuracy which are imperatively required in nurses doing general surgical work.

Bibliography

Endelmann: Gyn. Rundschau, p. 910, 1909.
Gönner: Correspondenzblatt f. Schweizer ärzt, Bd. 39, p. 13, 1909.
Hannes: Zeitsch. f. Geburtsh. u. Gynäkol., Bd. 65, Heft 1, 1909.
Meissner: Zentralblatt. f. Gynäkologie, p. 1520, 1909.
Neu: Deutsche m. Wochenschrift, No. 10, 1909.
Reynolds: Boston Medical Journal, June 24, 1908.
Schauta: Weiner m. Wochenschrift, No. 45, 1908.
Tsui: Archiv. f. Gynäkologie, Bd. 89, 1909.
von Franqué: Wiener k. Wochenschrift, No. 35, 1910.

PART I

THE SURGERY OF PREGNANCY

UTERINE DISPLACEMENTS

The Cause of Uterine Displacements in the Pregnant Patient.—Uterine displacements are a recognized cause for threatening the interruption of gestation, may indirectly cause septic infection, and may seriously interfere with the comfort and general health of the patient.

Anteflexions.—A sharply anteflexed pregnant womb is seen most frequently in those patients ill-developed, assimilating badly, with faulty elimination, and with pernicious nausea and vomiting. Pelvic tenesmus is often present. These patients usually come to the interruption of pregnancy because of toxemia. Dilation and cureting, with gauze packing, corrects the position of the uterus and usually relieves the symptoms. Anterior dislocations of the pregnant anteflexed uterus, less pronounced in character, may occasion disturbance of the bladder through pressure and require treatment. They may be corrected by removing abdominal pressure with clothing, causing the patient to empty the bladder at frequent and regular intervals, and the assumption of the knee-chest posture. Tampons of carded wool boiled in lysol are often useful.

Retroversion and Retroflexion of the Pregnant Womb.—This condition is important because of the danger of incarceration of the pregnant womb, followed by the death of the ovum and the development of infection.

As soon as the diagnosis of retroflexion or retroversion in pregnancy is made, the patient should suspend the clothing entirely from

the shoulders without waist constriction. The bladder and the bowels should be emptied regularly, the patient should be placed in the knee-chest posture, and a cautious effort made to carry the fundus to one side of the promontory of the sacrum and above the pelvic brim. Violence should be avoided and the operator should cease his efforts if the patient complains of pain. If such effort be unsuccessful, a tampon of carded wool of moderate size and making but moderate pressure should be inserted, while the patient is in the knee-chest posture, making gentle pressure upon the fundus. This should be renewed in forty-eight hours. The patient may take moderate exercise, but report at once pain in the back and abdomen, and upon such symptoms she should go to bed and send for the physician.

If the womb does not right itself with these simple measures at the end of the second or the beginning of the third month, two courses of action are open for the obstetrician:

The patient may keep in bed, lying upon the sides or abdomen, the bladder emptied at frequent intervals, and the bowels moving regularly. More than two-thirds of such cases will right themselves without further interference. The knee-chest posture is always an efficient aid.

If the patient cannot give the time to this, she should be anesthetized, the bladder emptied by catheter, the rectum having previously been emptied by injection, and the obstetrician attempt to replace the womb. This he may do by making pressure with two fingers upon the fundus, carrying it to one or the other side of the promontory of the sacrum (Fig. 3). In some cases this is done more easily if the patient while anesthetized is turned upon her side, the tenaculum forceps introduced into the cervix, and the cervix drawn gently downward and backward, while pressure is made upward as indicated. This will succeed where adhesions have not developed. After the womb is replaced, the vagina should be tamponed moderately with carded wool boiled in lysol, the cervix carried backward and the uterus upward, to prevent a return of the retroflexion.

If such manipulation fails, the operator has his choice of two

methods: One consists in keeping the patient in bed, placing her in the knee-chest posture, distending the posterior vaginal wall and pelvic floor with Sims' speculum and introducing strips of surgeon's lint, sterilized and soaked in sterile glycerin, into the posterior vaginal vault against the fundus. Moderate pressure should be exercised and this packing should be renewed in thirty-six or forty-eight hours.

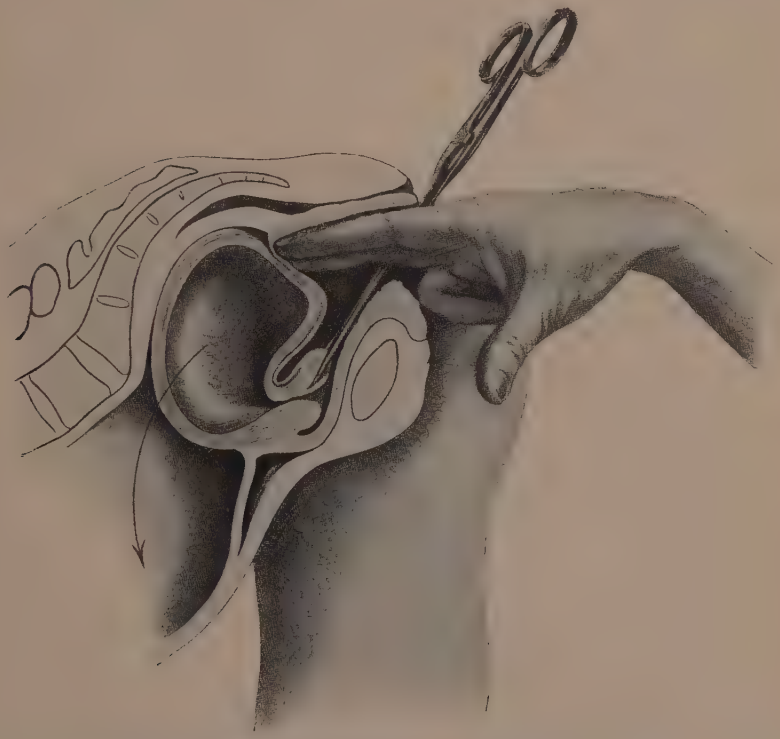

Fig. 3.—Replacing retroverted gravid womb. Patient in knee-chest posture (Bumm).

The patient should lie upon the sides or abdomen, and will often require the use of the catheter at regular intervals.

If this does not succeed, the question of abdominal section must be seriously considered. If the uterus is not replaced, pressure will bring about hemorrhage into the decidua, the ovum will die, its discharge will be incomplete, and the operator will be confronted with an incarcerated septic uterus. Abdominal section or vaginal extirpa-

tion will then be indicated. To anticipate this condition, it is advisable, where other means have failed, to open the abdomen and endeavor to release the retroverted gravid womb. The patient should be placed in the Trendelenburg posture, the bladder having been completely emptied by catheter, and when the abdomen is opened the operator should make a gentle but thorough effort to release the fundus. Adhesions may be separated by the fingers covered with gauze, or cautiously severed with blunt-pointed scissors. After the uterus has been replaced the tubes and ovaries should be examined, and if they are adherent they also should be loosened. A strand of iodoform gauze (10 per cent.) should be passed through the lower end of the abdominal incision behind the fundus, serving as a drain, to check oozing from adhesions, and maintain the womb in its new position. This may gradually be removed in a few days following the operation. After such an operation the patient may be given morphin for a few days to prevent uterine contractions.

Where the retroverted gravid womb has become infected and cannot be replaced, success has been reported by vaginal extirpation of the uterus. This is done in the usual manner, gauze packing being inserted to drain the pelvis and control oozing for several days after the operation.

If the patient is in good general condition, an effort may be made to retain the uterus, although septic. The abdomen should be opened and the uterus replaced, gauze packing inserted, and brought out at the lower end of the abdominal incision; following this the mouth of the womb should be cautiously dilated through the vagina, débris brought away with a blunt curet, and a packing of iodoform gauze (1 per cent.) introduced within the uterine cavity. The vagina should be packed with bichlorid gauze to assist in maintaining the uterus in its new position. With this combined operation the uterus is drained, hemorrhage prevented, the womb is replaced, and the patient, in good condition, may thus recover, retaining the uterus.

Retaining the Uterus in Normal Position After Retroversion During Pregnancy.—A retroverted gravid womb after replacement

may be retained in position in the early weeks of pregnancy by a suitable pessary. A retroversion pessary with a soft-rubber posterior bar is best adapted for this purpose. Vaginal douches of boric acid or 1 per cent. lysol must be taken daily to maintain cleanliness. The pessary should be removed as soon as possible. The permanent relief of retroversion by operation is rarely required during pregnancy. The conditions are not favorable for such an operation, and it should be resorted to only in extreme cases. Shortening of the round ligaments or extensive repair of the pelvic floor is only justifiable in extreme cases. After such a patient has passed through pregnancy and labor, she should then be subjected to intra-abdominal shortening of the round ligaments, or some other suitable operation for the permanent correction of the backward displacement.

Prolapse of the Pregnant Womb.—Prolapse of the pregnant womb may be so pronounced as to cause the patient great inconvenience and threaten the termination of gestation. Such cases are most unfavorable for operation and should be treated by palliative measures, including rest in bed, wool tampons, and proper abdominal support. Should abortion occur followed by infection, the complete removal of the uterus would be indicated, followed by pelvic drainage.

Hernia of the Pregnant Womb.—In anemic women, usually multiparæ with separation of the recti muscles, abdominal hernia may include the pregnant uterus. The treatment of the condition must be palliative during pregnancy, and operation must be postponed until after the patient has recovered from labor. Relief during pregnancy may be obtained by suitable bandaging, which should be worn during labor to facilitate the expulsion of the fetus.

Bibliography of Uterine Displacements

Baisch: Zeitschr. f. g. Urologie, Bd. 1, Heft 1, 1909.
Bennecke: Zentralblatt f. Gynäkologie, No. 23, 1906.
Born: Zentralblatt f. Gynäkologie, No. 4, 1907.
Campbell: Jour. of Obstet. and Gynecol. of British Empire, Dec., 1909.
Cooke: British Medical Journal, May 15, 1909.
Couvelaire: Ann. de Gyn. et Obstet., March, 1909.
Diebel: Archiv f. Gynäkologie, Band 63, Heft 1 and 2, 1901.

Glinski: Przeglad Lekarski, No. 26, 1909.
Henkel: Minchener m. Wochenschrift, No. 17, 1909.
Littauer: Zentralblatt f. Gynäkologie, No. 26, 1909.
Lobenstine: American Journal of Obstetrics, Dec., 1909.
MacNaughton-Jones: British Medical Journal, May 11, 1901.
Marschner: Zentralblatt f. Gynäkologie, No. 38, 1902.
Martin: La Gynecologie, July, 1909.
Orthmann: Frauenarzt, Heft 10, 1909.
Pestalozza: La Ginecologia, January 15, 1907.
Swayne: Bristol Medical Journal, Nov. 20, 1909.
Thomson: Zentralblatt f. Gynäkologie, No. 19, 1906.
Zeigenspeck: Zentralblatt f. Gynäkologie, No. 23, 1908.

REPAIR OF LACERATIONS OF THE UTERUS DURING PREGNANCY

The torn cervix, with enlargement of its mucous follicles and chronic catarrh, will usually be worse during gestation. If possible, operation should be postponed until after labor. In extreme cases, where the torn cervix is so greatly enlarged that it assists in prolapse and the interruption of pregnancy is threatened, repair may be undertaken. Unusual hemorrhage is often experienced in such operations upon pregnant patients, and union is not always satisfactory.

THE REMOVAL OF UTERINE TUMORS DURING PREGNANCY

The occurrence of pregnancy in a fibroid uterus raises the question of operation during pregnancy, or of allowing the patient to go through labor with the hope that the fibroid will disappear during uterine involution. The choice of a method of treatment will depend greatly upon the situation of the fibroid. If it be upon the fundus or posterior wall of the uterus, and small in size, it will probably occasion little or no discomfort during the pregnancy, will not complicate labor, and may remain quiescent indefinitely after the patient's recovery. If the fibroid is low upon the uterus, so that it will obstruct the passage of the child through the pelvis, and if multiple fibroids occur, occupying a large part of the uterine tissue, the fetus will have difficulty in birth and uterine contractions will be deficient. Under these circumstances it may be best to allow the patient to go to term, delivering her by abdominal and uterine incision, followed by hysterectomy.

The pregnant patient having a fibroid tumor of considerable size is liable to complications at any time during pregnancy. Often in the early months such tumors may become wedged in the pelvis, as in a

Fig. 4.—Uterus with fibromyomata, and containing a full-time child, removed by panhysterectomy during labor (Bland-Sutton).

case described by Bland-Sutton.[1] This patient, a primipara in the fourth month, after a long motor-car journey, was taken with severe

[1] Jour. Obstetrics and Gyn., British Empire, December, 1907.

pelvic pain, vomiting, and abdominal distention. A large fibroid growing from the cervix had become firmly wedged in the pelvis. Hysterectomy was necessary to relieve the patient.

An effort has been made to anticipate complications in labor by removing fibroid tumors in the pregnant womb by myomectomy.

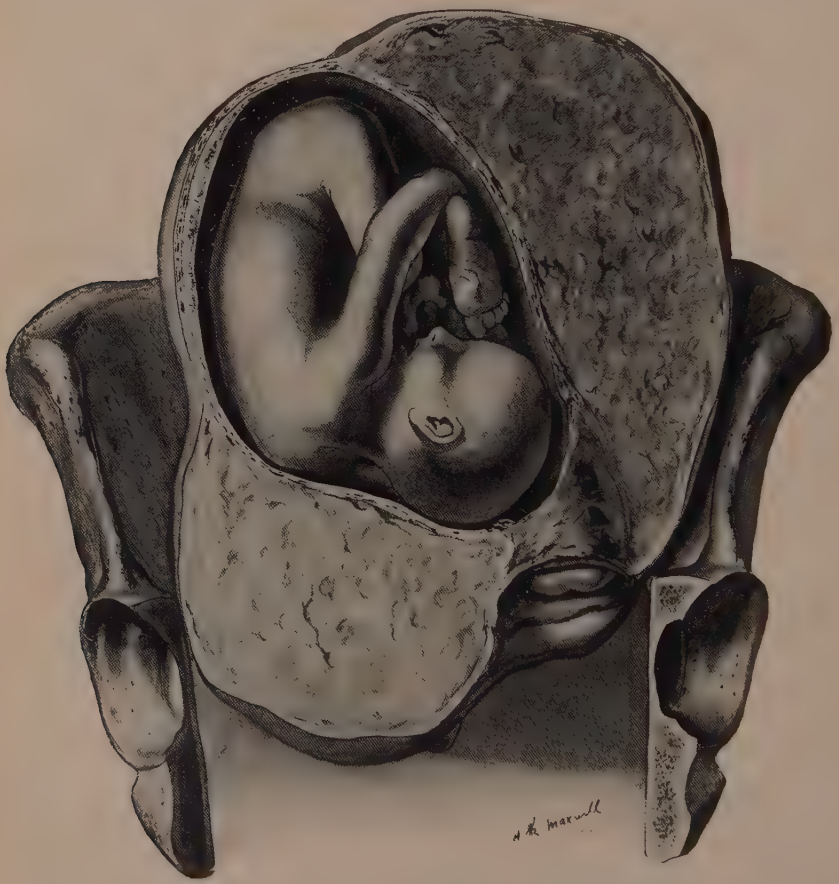

Fig. 5.—Fibromyomata associated with pregnancy (Kerr).

This procedure is not entirely satisfactory, for small tumors rarely require removal during pregnancy, and the removal of large tumors is often followed by serious consequences. If large tumors be present it is best to allow the patient, if possible, to go to viability, and then deliver the child by abdominal section, followed by hysterectomy.

Pedunculated fibroids and uterine polyps should be removed during pregnancy as soon as their existence is discovered. This procedure usually causes no disturbance.

In dealing with cancer of the womb complicating pregnancy, the operator must carefully consider the period of gestation and consult the patient's wishes regarding the possible life of the child. If a pregnant patient comes under observation in the early months of gestation, and a positive diagnosis of carcinoma, sarcoma, or epithe-

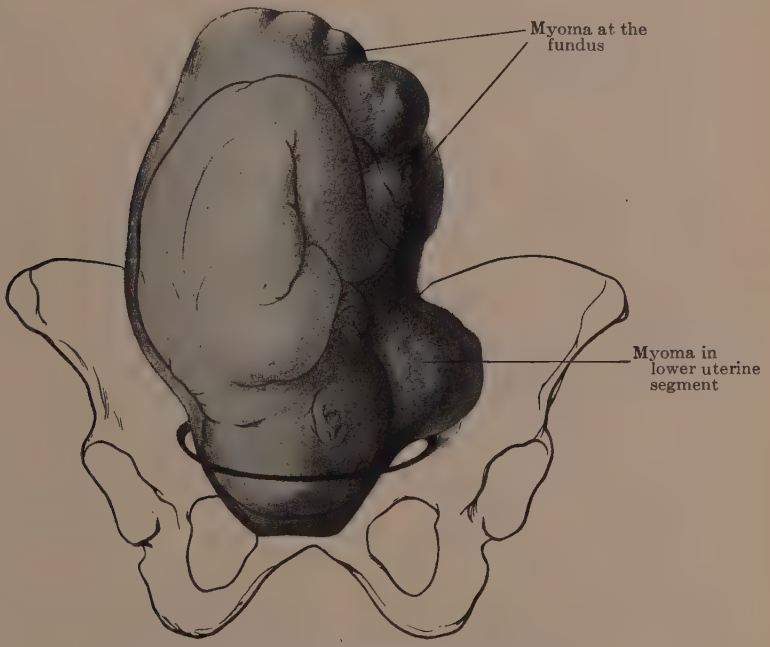

Fig. 6.—Myomata complicating labor (Bumm).

lioma of the uterus be made, it is undoubtedly wisest to sacrifice the uterus by total extirpation. If, however, she presents herself late in pregnancy, within a short time of viability, the malignant growth involving the cervix, but not the body of the womb, she may decline extirpation of the uterus in the hope of obtaining a living child. Under these circumstances the fetus should be delivered when viability is assured by abdominal and uterine section, followed by the complete removal of the uterus. Formerly the effort was made to

Fig. 7.—Flattened submucous myoma which simulated a prolapsed cord (Kerr).

remove cancer of the cervix by cautery, in the hope of staying the progress of the disease and avoiding the interruption of pregnancy.

Such interference, however, is practically useless and should not be adopted.

Bibliography

Audebert: British Medical Journal, Nov. 6, 1909.
Barbour: Lancet, vol. 1, p. 512, 1907.
Berger: Thesis, Paris, 1907.
Bland-Sutton: Journal of Obstetrics and Gynecology of the British Empire, December, 1907; British Medical Journal, July 4, 1908, June 19, 1909.
Bonnaire and Brindeau: Bull. de la Soc. d'Obstet. de Paris, No. 3, 1909.
Brewis: British Medical Journal, vol. 1, p. 80, 1907.
Burty: Thesis, Paris, No. 396, 1906 and 1907.
Büttner: Deutsche med. Wochenschrift, vol. 33, p. 844, 1907.
Cullen: Journal of American Medical Association, January 11, 1908.
Declage and Gaujoux: Gazette Des hôp., No. 50, 1907.
Doran: American Journal of Obstetrics, vol. 55, p. 103, 1907.
Iwanoff: Annal. des Gyn., vol. 4, p. 311, 1907.
Joubert: Thesis, Paris, p. 317, 1906 and 1907.
Kayser: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 1, 1907, and vol. 25, p. 76, 1907.
Kerr: Zentralblatt f. Gynäkologie, No. 14, 1909.
Kufferat: Zentralblatt f. Gynäkologie, No. 40, 1909.
Lockyer: British Medical Journal, October 9, 1909.
Macé: Ann. de Gyn. et Obstet., March, 1909.
Mann: American Journal of Obstetrics, vol. 55, p. 737, 1907.
McMurtry: Surgery, Gynecology, and Obstetrics, March, 1908.
Michin: Festschr. von Ott, St. Petersburg, Part I, 1906.
Piquand and Lemeland: L'Obstétrique, July, 1909.
Pozzi: Zentralblatt f. Gynäkologie, No. 40, 1909.
Schütze: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 761, 1907.
Simon: Münchener med. Wochenschrift, vol. 54, p. 1071, 1907.
Smyley: British Medical Journal, January 23, 1909.
Spaeth: Deutsche m. Wochenschrift, No. 10, 1908.
Spencer: Surgery, Gynecology, and Obstetrics, May, 1909.
Speransky and Bachmetew: Zentralbl. f. Gynäkol., No. 16, 1909.
Stone: American Journal of Obstetrics, vol. 55, p. 229, 1907.
Thring: Journal of Obstetrics and Gynecology of the British Empire, vol. 10, No. 3, 1907.
Vineberg: American Journal of Obstetrics, vol. 55, p. 655, 1907.

OPERATIONS UPON THE FALLOPIAN TUBES AND OVARIES

Operations Upon the Fallopian Tubes During Pregnancy.—Infection antedating pregnancy or accompanying it may cause salpingitis with infection of surrounding tissues. When such occurs, operation should not be immediately undertaken, in the hope that the inflammation may subside and the patient go on to term. If, however, the patient does not promptly improve, the infected tube should be removed with other surrounding tissue found to be infected also. If there is great adhesion in the pelvic viscera, with masses in the pel-

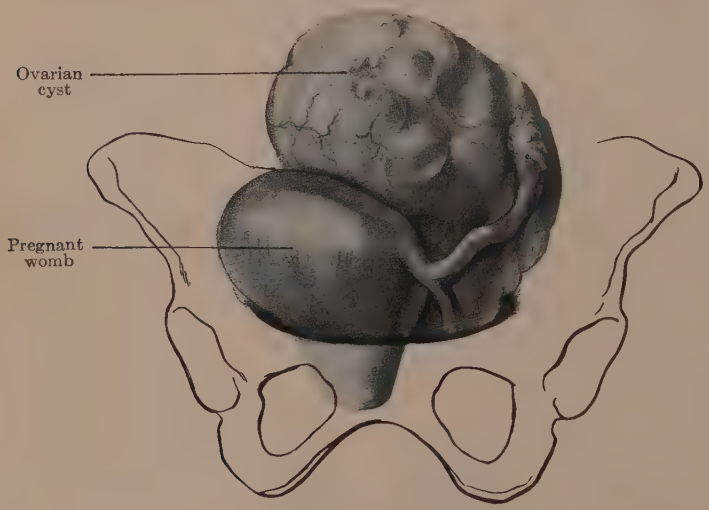

Fig. 8.—Ovarian cyst complicating early pregnancy (Bumm).

vis and the development of pelvic abscess, a conservative method should be followed. The pelvic cavity should be opened freely by a wide incision in the posterior vaginal fornix, and when the pus-tubes have been found and clearly located, they should be opened by blunt scissors and drained through the vagina. Care should be taken to avoid the intestines, and as little disturbance as possible of the pelvic organs should be practised. Hydrosalpinx, in the absence of acute infection, does not call for operation.

Operations Upon the Ovaries During Pregnancy.—The ovary not the seat of tumor rarely requires operative treatment during ges-

tation. In chronic salpingitis the ovaries may be bound down by adhesions, and it is usually wiser to leave them in the abnormal

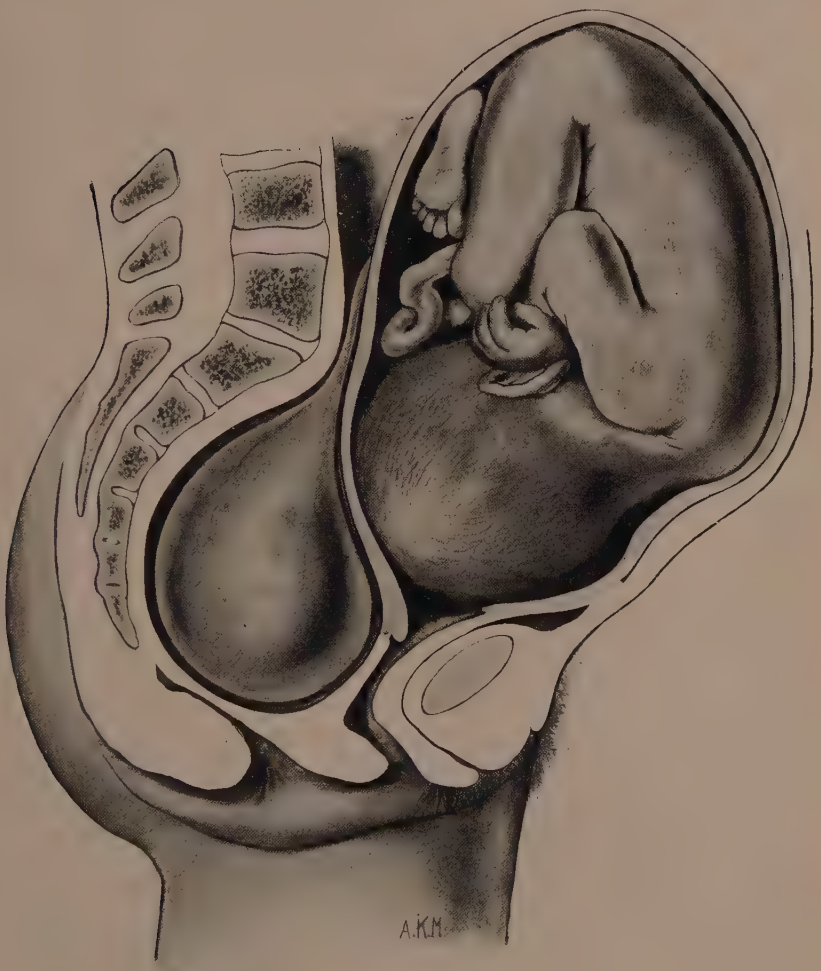

Fig. 9.—Ovarian cyst entirely in the pelvis. This tumor was pushed out of the pelvis in the second stage of labor, and the child extracted with forceps. The tumor was removed three weeks after the confinement by abdominal section (Kerr).

position than to do violence by separating them. If a definite ovarian growth can be recognized, it should be removed as soon as possible, no matter what the period of pregnancy may be.

Ovarian tumors complicating pregnancy were formerly allowed to remain undisturbed through fear of interrupting pregnancy. In Flatau's collection[1] of 284 cases of ovariotomy during pregnancy, the interruption of gestation occurred in 17 per cent. The abdominal route is far superior to the vaginal in ovariotomy during pregnancy, for interruption by the latter method occurred in 49 per cent. In removing ovarian tumors complicating pregnancy the extreme Trendelenburg position should be avoided. The tumor should be carefully and gently removed, the vessels in the pedicle being ligated separately. All exposed points should be covered with peritoneum and stitched with catgut. Chloroform and oxygen is a good anesthetic for these cases, as cough and irritation are less than with the use of ether. The mortality for the children has been estimated between 4 and 5 per cent. An additional reason for removing ovarian tumors complicating pregnancy lies in the possibility that twisting of the pedicle will occur, followed by necrosis and peritonitis. By some this is ascribed to the intermittent contractions of the uterus, and by others to the efforts of the uterus to accommodate itself to the abdominal cavity. The complication is of sufficient frequency to make the removal of every ovarian tumor complicating pregnancy advisable as soon as the diagnosis of the existence of the tumor can be made.

Bibliography

Andrews: British Medical Journal, vol. 2, p. 1584, 1907; Journal of Obstetrics and Gynecology of the British Empire, October, 1909.
Bircher: Zentralblatt f. Gynäkologie, vol. 31, p. 1378, 1907.
Birkhoven: Inaug.-Diss., Giessen, 1905.
Burdsinski: St. Petersburg, Med. Wochens., vol. 32, 1907.
Connel-Sheffield: Journal of Obstetrics and Gynecology of the British Empire, vol. 10, No. 2, 1907.
Conway: Journal of Obstetrics and Gynecology of the British Empire, August, 1907.
Cumston: Journal of Obstetrics and Gynecology of the British Empire, September, 1908.
Davis: Surgery, Gynecology, and Obstetrics, May, 1909.

[1] Archiv f. Gyn., 1907, Band 82.

Demsch: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 143, 1907.
Doran: Journal of Obstetrics and Gynecology of the British Empire, February, 1908.
Flatau: Archiv f. Gynäkologie, Band 82, p. 452, 1907.
Grad: Jour. Amer. Med. Assoc., November 27, 1909.
Horn: Münchener med. Wochens., vol. 54, p. 703, 1907.
Kerr: Glasgow Medical Journal, September, 1907; Journal of Obstetrics and Gynecology of the British Empire, January, 1908.
Küstner: Zentralblatt f. Gynäkologie, vol. 30, p. 1025, 1907.
Kynock: Journal of Obstetrics and Gynecology of the British Empire, August, 1908.
Liepmann: Zentralblatt f. Gynäkologie, No. 11, 1907.
Marshall: Journal of Obstetrics and Gynecology of the British Empire, February, 1910.
Martin: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 767, 1907; Archiv prov. de Chir., No. 2, 1907; Thesis, Lille, No. 29, 1906 and 1907.
Morestin: Annal. des. Gyn., Part 2, vol. 4, p. 602, 1907.
Nijhoff: Zentralblatt f. Gynäkologie, November 28, 1905.
Oui: Annal. des Gyn., Part 2, vol. 4, 1907.
Petri: Zentralblatt f. Gynäkologie, No. 30, 1909.
Pfannenstiel: Deutsche. med. Wochens., vol. 33, p. 1278, 1907.
Retzloff: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, 1907.
Robb: Cleveland Medical Journal, June, 1907.
Rushmore: Surgery, Gynecology, and Obstetrics, November, 1909.
Sahnwaldt: Inaug.-Diss., Breslau, 1909.
Schumann: Inaug.-Dissert., Marburg, 1906.
Simon: Münchener med. Wochens., vol. 54, p. 1209, 1907.
Spencer: Surgery, Gynecology, and Obstetrics, May, 1909.
Stirling: Intercol. Med. Jour. of Australasia, July 20, 1907.
Treub: Zentralblatt f. Gynäkologie, vol. 31, p. 1448, 1907.
Weller: Inaug.-Dissert., Berlin, 1906.
Widmann: Inaug.-Dissert., Freiburg, 1905.
Zemmel: Lancet, vol. 1, p. 27, 1907.
Zickel: Zentralblatt f. Gynäkologie, No. 14, 1907.

OPERATIONS UPON THE PELVIC FLOOR AND PERINEUM DURING PREGNANCY

Where extensive laceration has occurred in previous labors, and the uterus is prolapsed and abortion threatened, it may be necessary to repair the pelvic floor during gestation. The usual operation

may be done, taking care to avoid extensive denudation and the formation of a rigid perineum, which will tear at the termination of pregnancy. If, in addition to her lacerated state, the woman be in bad general health, good union can scarcely be expected. During such operations it will be necessary to control hemorrhage carefully and to operate as quickly as possible, as the tissues are unusually vascular and severe blood loss may occur.

OPERATIONS UPON THE RECTUM DURING PREGNANCY

Many pregnant patients suffer from hemorrhoids, in some cases complicated by eversion of the mucous membrane and great irritation. The operator may be strongly tempted to operate in these cases, ligating and removing hemorrhoids or dissecting out the mucous membrane of the rectum with its enlarged veins. The interruption of pregnancy so often follows this operation that it is to be avoided and the patient's condition palliated until the pregnancy has ended. Should hemorrhage occur from bursting of the hemorrhoids or accidental wounding, the individual tumor should be ligated under antiseptic precautions.

EMPTYING OF THE UTERUS BEFORE VIABILITY; THERAPEUTIC ABORTION

Therapeutic abortion is indicated when the pregnant woman's life is threatened by a serious condition found in pregnancy only. The most frequent state requiring therapeutic abortion is the toxemia of pregnancy, with or without pernicious nausea. The decision to operate in these cases must not be made hastily. The patient should have been under observation for several days. The blood should have been thoroughly examined, a nitrogen partition of the urine made, accurate records kept of the amount of nourishment taken, the blood-pressure recorded, and the patient's condition accurately ascertained. The statement that the patient can retain nothing, made by herself and her friends, that she vomits constantly, that she cannot sleep, that she cannot endure the pregnancy, such remarks are to be taken not to indicate her real condition, but her unwillingness

to go through gestation. When a pregnant patient has developing pernicious anemia, with profound disturbance in the nitrogenous excretion, inability to assimilate food, and depression of the nervous system, which these conditions cause, delay should cease.

Acute tuberculosis is also a justifiable cause for therapeutic abortion; so is a mental or nervous condition in the mother, which would be transmitted to her offspring, resulting in insanity or constitutional nervous disorder.

Contracted pelvis is not an indication for therapeutic abortion, nor is the presence of a fibroid tumor in the womb, an ovarian tumor, or cancer of the womb. Therapeutic abortion should not be practised in the acute infections, as it tends to increase the burden under which the patient labors.

Care should be taken not to attempt therapeutic abortion by slow and uncertain methods. The introduction of sounds and tents is unsatisfactory and should be rejected for more efficient procedures. It will be remembered that it is impossible to empty the uterus by any one procedure, but that the life of the embryo can be interrupted and the uterus be put in the most favorable condition possible for the discharge of the deciduous membranes.

In selecting an anesthetic for therapeutic abortion, the condition of the patient must be considered. Bronchial infection or irritation suggests the employment of oxygen and chloroform. Toxemic conditions contraindicate the use of chloroform, because of the danger of acidosis and acetone intoxication. If chloroform be selected, it should be largely diluted with oxygen.

The patient should be prepared for operation in the manner usual for any vaginal procedure. After catheterization and under antiseptic precautions, the uterus should be dilated sufficiently with solid bougies to permit the introduction of a blunt curet. With this as much as possible of the ovum should be removed, and the uterus irrigated and packed firmly with 10 per cent. iodoform gauze. The vagina should be packed with bichlorid gauze, and carried into a position favorable for drainage. Gauze packing should be allowed

to remain undisturbed for from thirty-six to forty-eight hours; it may even remain seventy-two hours without danger, if the patient receives good aseptic care. Tonic doses of strychnin and ergot should be given to promote uterine contractions. Upon removing the gauze the embryo will accompany or shortly follow it, and involution will go on much more promptly than in cases where the packing has not been used. Occasionally, it is necessary to repack the uterus because all of its contents does not come away, and hemorrhage may occur. Such packing may remain forty-eight hours, when, upon its removal, the uterine contents is usually found adherent to the gauze. This method of emptying the womb in the early months of gestation has proved satisfactory. The administration of drugs is too uncertain and dangerous, and the introduction of tents and bougies too slow and inefficient to be recommended.

In cases where the cervix is so resisting that it cannot be dilated sufficiently for cureting and the introduction of gauze, Newell's dilator or Bossi's dilator may be employed. Both should be used with caution, the latter especially, because considerable laceration of the cervix may result. It is occasionally necessary to incise the cervix, or to perform vaginal Cesarean section, because the uterus cannot safely be dilated. Should serious laceration of the cervix occur during operation, it should be closed with chromicized catgut. The operator should be sure of his ground before performing therapeutic abortion. This is possible only in cases where the patient is under accurate observation, and where accurate records are kept.

In cases where viability is not present, and pregnancy must be interrupted after the early months of gestation are past, the operator must secure sufficient dilation, if possible, to remove the fetus at the time of operation. This can be done by Bossi's or Newell's dilator, by incising the cervix, or by vaginal Cesarean section. In delivering the premature fetus, the danger of dismemberment must be kept in mind, as a severed head is sometimes left within the womb. As the life of the fetus cannot be saved, extraction should be made slowly and carefully by pulling upon the lower extremities, and care

taken to dilate the cervix thoroughly to secure the extraction of the head. If this be left behind, it may be removed by the placental forceps or by the cranioclast, or by long curved forceps with serrated blades. Should this not readily be accomplished, the operator can pack the cervix and uterine cavity as firmly as possible with 10 per cent. iodoform gauze. The uterus will dilate and expel its contents. Under antiseptic precautions portions of the fetus may remain within the womb for several days without the development of infection.

EMPTYING THE UTERUS AFTER VIABILITY AND BEFORE FULL TERM; THE INDUCTION OF LABOR

No operation has had made for it greater claims than the induction of labor. In some quarters it is supposed to be a panacea for contracted pelvis and the complications which full-term pregnancy produces. In properly selected cases and in good hands it is undoubtedly a valuable and justifiable operation, but improperly applied it increases fetal mortality and maternal morbidity, causes the mother great suffering, and results in a labor which is usually artificial and often prolonged.

A common indication for the induction of labor is disproportion between mother and child. This may arise because the fetus is overgrown or because the mother is undersized. In the former, pregnancy has usually gone beyond its natural limit; in the latter labor is usually induced before full term has arrived. Labor is also induced for conditions in the mother which threaten her life if pregnancy be prolonged. Heart lesions with failing compensation, tubercular infection, rapidly developing toxemia, and profound anemia may require the termination of pregnancy prematurely; and on the side of the fetus, habitual fetal death at a certain period in gestation may cause pregnancy to be terminated before that time, with the hope of securing a viable child. Labor is also induced in cases where the mother has previously had a difficult confinement terminating in the birth of a dead child, and where large development of the fetus and

slight pelvic contraction or abnormality have produced fatal birth pressure. The induction of labor is here based upon the hope that the

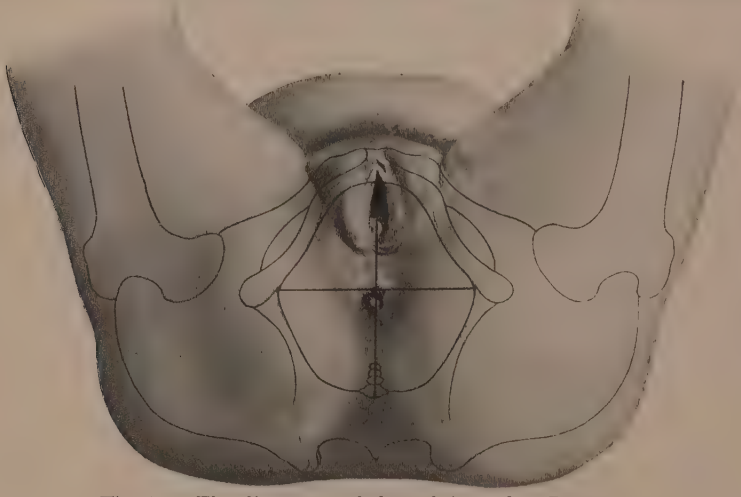

Fig. 10.—The diameters of the pelvic outlet (Bumm).

smaller fetus with softer bones will pass safely through the birth-canal.

Fig. 11.—Measurement of the anteroposterior diameter of the pelvic outlet (Bumm).

Labor is induced in primiparous patients where slight disproportion between mother and child is present; such may be termed pro-

phylactic induction of labor in comparison with prophylactic version. Its object being to deliver the smaller child with softer bones, avoiding the risk of birth pressure at full term.

The induction of labor is not to be confounded with the rapid emptying of the pregnant uterus, accouchement forcé, which has long been practised in obstetric emergency. The induction of labor endeavors to imitate spontaneous parturition, the gradual beginning of

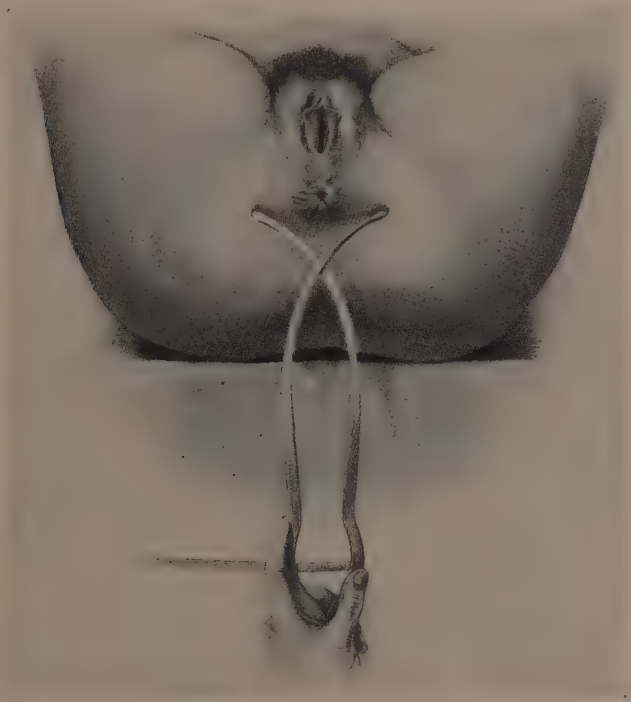

Fig. 12.—Measurement of the transverse diameter of the pelvic outlet (Bumm).

uterine contractions, gradual dilation of the birth-canal, and the expulsion of the child by the mother's spontaneous efforts.

The Time for Inducing Labor.—Two methods of choosing the time for the induction of labor are employed. In one the pelvis is measured as accurately as possible, and the true conjugate is taken as the most important diameter. If this be less than 8 cm. ($3\frac{1}{2}$ inches), the induction of labor with the hope of obtaining a vigorous child may be declined. If the true conjugate measures between 8 and 9 cm.

the induction of labor should be practised, as nearly as can be ascertained, between the thirty-second and thirty-fourth weeks of gestation. Where the true conjugate measures from 9 to $10\frac{1}{2}$ cm. the induction of labor may be practised at the thirty-sixth week. On the average, such methods give the best results in the majority of cases. Their success depends upon an accurate history, giving precise information concerning the duration of pregnancy, an accurate measurement of the pelvis, and the records of the size of the fetus, obtained by a number of careful examinations. When one recalls how impos-

Fig. 13.—Internal measurement of the anteroposterior diameter of the pelvic inlet (Bumm).

sible it is to tell the exact period of gestation, it is readily seen that errors may arise which may cause labor to be induced too soon or too late.

Mueller's Method.—A second method of estimating the time for the induction of labor consists in fitting the head into the pelvis by suprapubic pressure, commonly known as Mueller's method.

The patient should be prepared for this examination by emptying the intestine and urinary bladder, and if she is excessively nervous or apprehensive she should be anesthetized. The hands of the

obstetrician are made aseptic and the patient's abdomen is covered by one thickness only of pliable linen. The patient is then placed across a bed or upon a table, with the lower extremities flexed. The obstetrician introduces two fingers of one hand into the vagina, against the fetal head, and ascertains its position at the pelvic brim.

Fig. 14.—Internal measurement of the anteroposterior diameter of the pelvic inlet (Bumm).

With the other hand by suprapubic pressure the head is gently carried downward and backward into the pelvic brim. With the two hands the ease or difficulty with which the head engages and passes down, and its relative size in comparison with that of the pelvis, are thus ascertained.

To be of practical value this examination must be repeated at

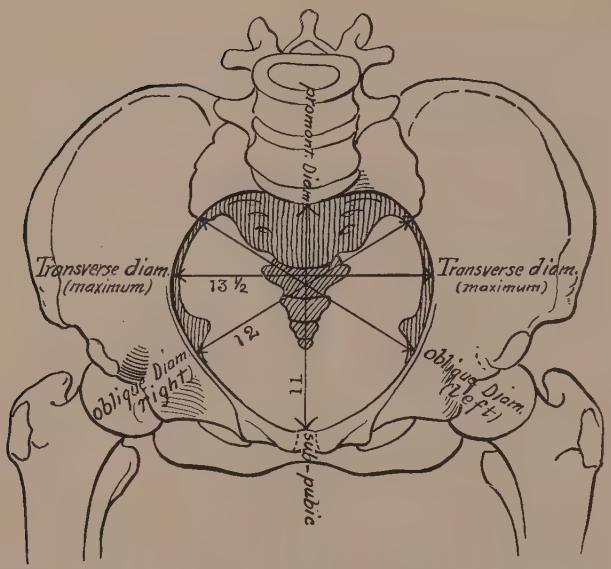

Fig. 15.—Diameters of the pelvic inlet (Farabeuf and Varnier).

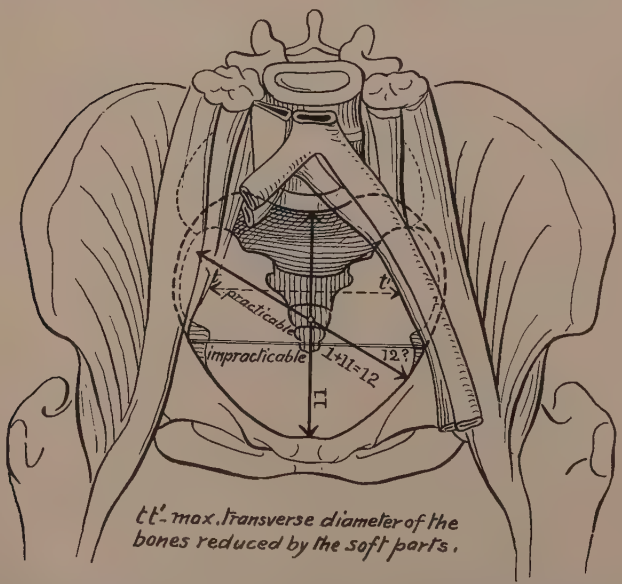

Fig. 16.—The practicable diameter of the pelvic inlet (Farabeuf and Varnier).

intervals of ten days to two weeks; in cases of moderate pelvic contraction, from the thirty-fourth to the fortieth weeks of gestation.

When the head enters the pelvic brim with difficulty, labor should be induced as soon as possible. In using this test the obstetrician

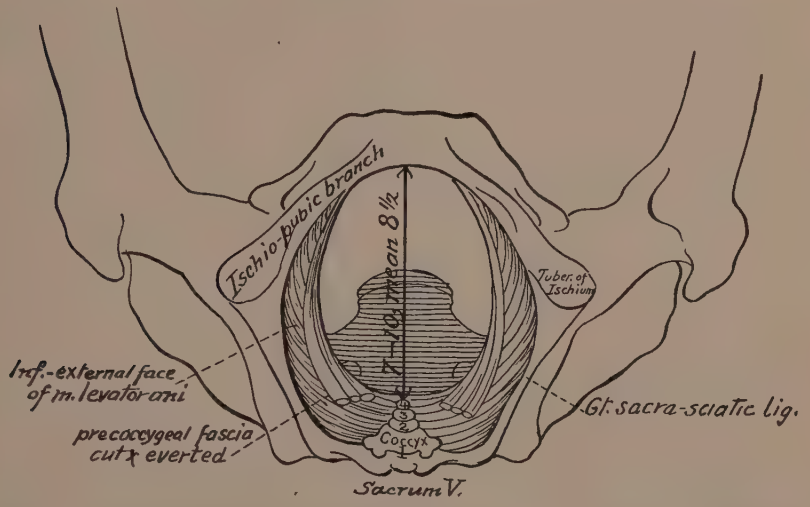

Fig. 17.—The pelvic outlet before the retropulsion of the coccyx (Farabeuf and Varnier).

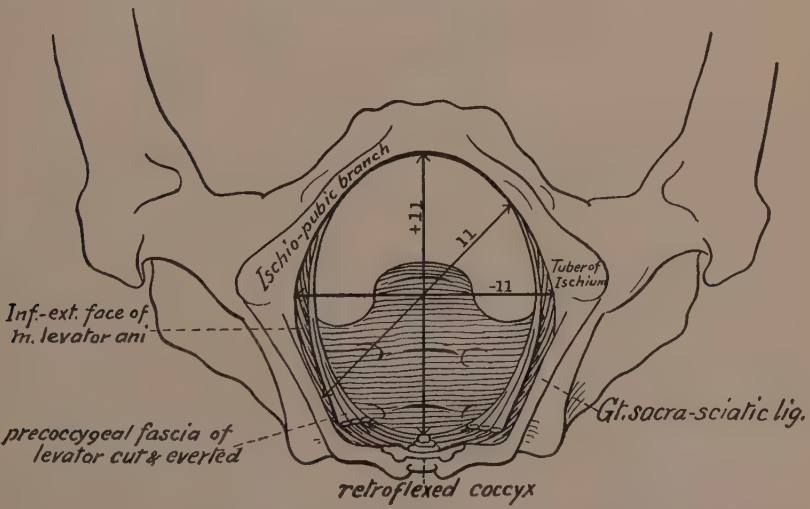

Fig. 18.—The diameters of the outlet after the retropulsion of the coccyx (Farabeuf and Varnier).

must study the way in which the head presents at the pelvic brim. If, by pressure upon the occiput, he can make the occiput descend

or the head partially engage in one of the oblique diameters, the indications are favorable for delivery by induced labor. If, however, the vertex will not descend, but the parietal bone comes down through lateral obliquity, the indication is that there is such disproportion between head and pelvis that an unfavorable presentation and mechanism should be expected during labor.

While Mueller's method is most valuable, it is evident that it is not an exact test, its frequent repetition is annoying to the patient, and it cannot be relied upon as a positive demonstration that vaginal delivery is possible.

The Test of Labor.—If the obstetrician declines to induce labor at a fixed time, based upon pelvic measurements and the probable size of the child, and if Mueller's method does not seem practical, there remains the most reliable of all tests, that of actual parturition. In this the patient is kept in the best possible physical condition, is urged to exercise freely, and the bowels are made to move thoroughly. If possible, the patient should take exercise with the trunk of the body forward upon the pelvis, thus furthering the descent and engagement of the head in the pelvic brim. Walking is also excellent. The patient must be so placed that the obstetrician can perform any operation necessary when labor develops. He should be summoned as soon as parturition begins. When a reasonable time has elapsed, with efficient pains to secure engagement, and engagement fails, the obstetrician may then elect abdominal or pubic section, in accordance with the circumstances of the case. By this method the number of operations will be reduced as low as possible, and the best results will be obtained for both mother and child. These cases should be sent to hospital for confinement, where abundant facilities for the best surgical work can be always in readiness.

Methods for the Induction of Labor.—The introduction of a sterile bougie or bougies into the uterus is unquestionably the safest method for the induction of labor. Its success depends upon the fact that the bougie irritates the uterine muscle, producing uterine contractions, fol-

lowed by dilation of the cervix. As the induction of labor is based upon the theory of exciting uterine contractions, that method will be most successful which directly stimulates the uterine muscle. No procedure which dilates the cervix only can result in the successful induction of labor. The uterine muscle acts by stimulation from the nervous ganglia beneath the muscle bundles, and if these are irritated the muscle is stimulated and contracts. The action of bougies is so uncertain and tedious and at times painful that, if this method is selected, as many bougies as can be introduced should be employed, three and sometimes four may be used with advantage.

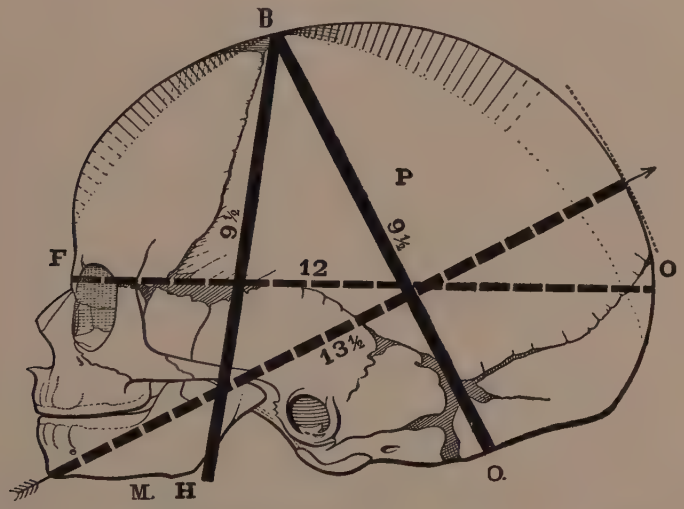

Fig. 19.—The diameters of the fetal head (Farabeuf and Varnier).

If gauze be introduced within the cervix and carried within the cavity of the womb, uterine contractions will ultimately come on. This method, however, is more tedious than the use of bougies, and is applicable only when, through hemorrhage or some other cause, gauze pressure is necessary.

The introduction of other substances within the uterus to produce contraction has not been found satisfactory. Sterile glycerin has been injected between the membranes and the wall of the uterus, producing uterine contraction. If the membranes be ruptured and consid-

erable amniotic liquid be allowed to escape, the uterus will ultimately contract. This method is exceedingly dangerous for the fetus, very uncertain, and should not be practised except in cases of acute infectious diseases, where it may be necessary to sacrifice the life of the fetus in the interests of the mother. The expulsion of the fetus is very gradual in these cases, and the method cannot be used with the hope of obtaining a living child.

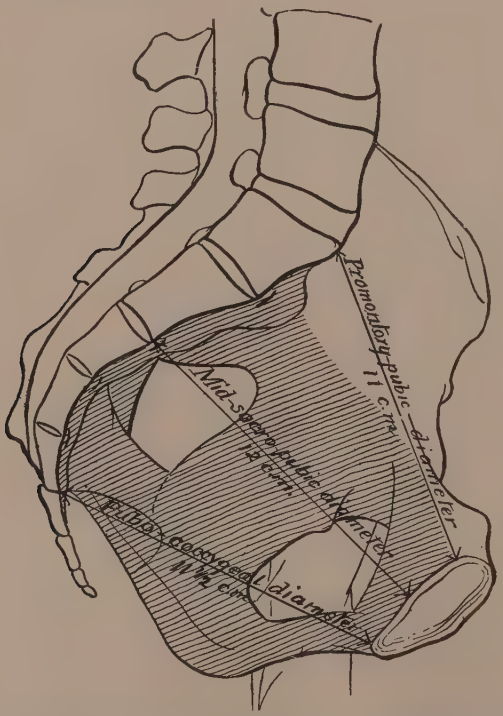

Fig. 20.—The diameters of the pelvic excavation (Farabeuf and Varnier).

To hasten the induction of labor dilating bags may be introduced into the cervix when bougies are inserted into the cavity of the womb. These may be distended at intervals with sterile water and the course of labor thus rendered shorter. The introduction of bags adds considerably to the patient's pain and in some cases stimulates uterine contractions markedly, and in others produces very little effect. It is in some cases disappointing to find that when the bags are re-

moved the partly dilated cervix contracts to almost its original proportions.

The Technic of the Induction of Labor.—The patient should be prepared for the induction of labor by emptying the lower bowel thoroughly with purgatives and high injections. The patient's diet should be liquid. The external parts should be prepared by shaving and scrubbing with soap and water, sterile water and bichlorid (1 : 2000). In healthy women a vaginal douche of 1 per cent. lysol, given gently, is sufficient; if the patient has had a profuse vaginal catarrh, suggesting endocervicitis during pregnancy, a douche of green soapsuds should be given, followed by boiled water and then by bichlorid solution (1 : 4000). It is well to introduce bougies just before the patient's bedtime, so that preliminary softening and dilation of the cervix may occur during the night. In some cases the cervix is sufficiently dilated to permit the introduction of bougies without anesthesia. In many cases brief anesthesia is necessary. This may be effected by chloroform or chlorid of ethyl, the patient placed upon her back at the edge of a bed with her limbs properly separated. Bougies cannot be boiled, as heat destroys their coating and elasticity. They may be thoroughly washed in soap and water and soaked in bichlorid solution (1 : 1000). The operator may require a speculum, uterine dressing forceps, uterine dilators, 10 per cent. iodoform, or sterile gauze and scissors. Tenaculum forceps are needed in many cases. If the cervix does not require dilation one or two fingers of one hand should be passed through the cervix, and with these fingers the os dilated as much as possible without rupturing the membranes. Without removing the fingers, a bougie is then placed along the palm of the inserted hand, rotating it, and allowing it to pass gently between the membranes and the wall of the uterus. Should it meet obstruction it should be partially withdrawn and introduced in another direction. The operator must remember that there is slight danger of separating the placenta with the bougies, and also of rupturing the membranes. Both of these accidents are avoided by patience and gentleness. An inch of the bougie may be left protruding from the

external os. The operator may then insert two or three in addition to the first, letting them go into any portion of the uterus where they find least resistance. It is well not to insert a bag in these cases until the cervix has been softened by uterine action during the night, following the introduction of bougies. These should be kept in place by a moderate vaginal packing of sterile or 10 per cent. iodoform gauze. A sterile vulvar dressing should be applied.

During the night following the introduction of bougies the patient will often require sedative medicine to procure rest and sleep—10 gr. of veronal with milk or broth may be given or, if the patient be excitable and nervous, ½ gr. of codein. If the bladder cannot be spontaneously emptied, a catheter should be used, at least once during the night. The nurse should be instructed to watch for vaginal hemorrhage, the occurrence of active uterine contractions, or the development of abdominal pain or tenderness. On the morning following the introduction of bougies the cervix will usually be found softened and somewhat dilated, uterine pains will sometimes develop regularly, but in other cases are scarcely present. Within twelve hours after the first introduction, the bougies should be removed and a vaginal douche of lysol (1 per cent.) given, and bougies or dilating bags or both should be again inserted.

In cases where the bougies must be introduced with instrumental dilation, the patient should have chloroform or ethyl chlorid, and the cervix dilated sufficiently to permit the introduction of several bougies. A bladed dilator, such as Bossi's or Newell's, may be used, care being taken to dilate very gradually and to carry the dilation only sufficiently far to permit the introduction of bougies.

After the removal of the first bougies, if pains are occurring regularly, the cervix dilating, and the membranes protruding into the cervix, and the general condition of the patient good, four bougies may again be inserted, accompanied by a packing of 10 per cent. iodoform gauze, filling the cervix as completely as possible. The patient may sit up if she desires and walk about slowly, but should

be cautioned not to make violent movements, to avoid rupturing the membranes.

If as little time as possible must be occupied in the induction of labor, after the cervix is softened by bougies, dilating bags may be

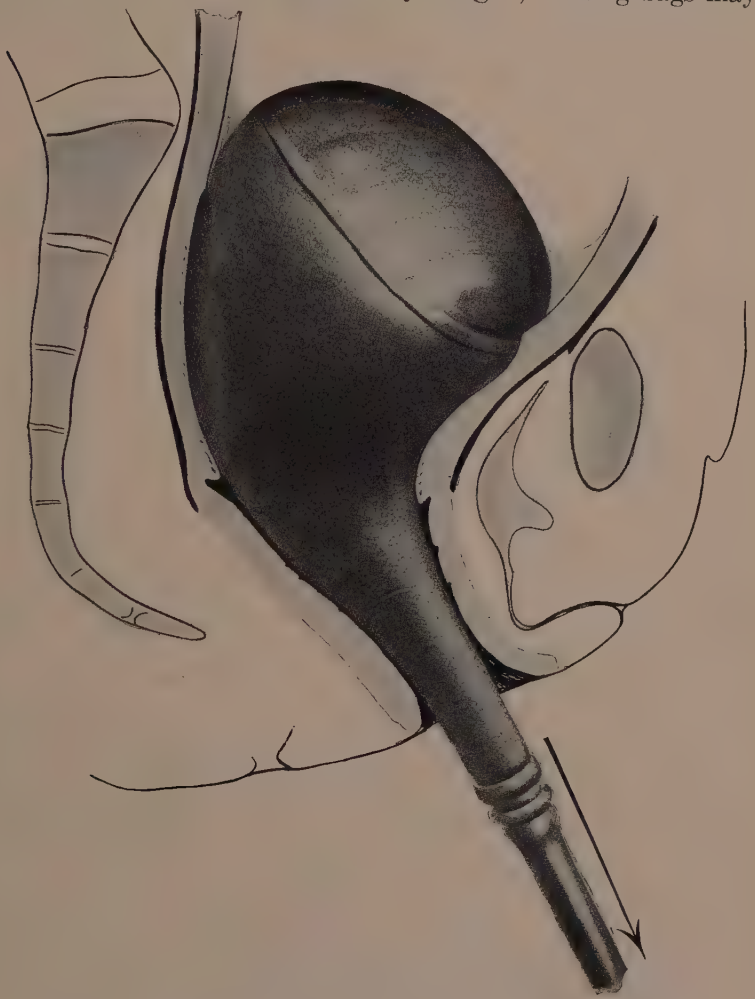

Fig. 21.—Dilation of the cervix by de Ribes' bag (Bumm).

used; such are, De Ribes', McLean's, Voorhees', Pomeroy's, and others devised by various operators. De Ribes' bag is inelastic silk, covered with rubber, and exerts constant and severe pressure. Other bags employed are elastic, made of rubber. The advantages

of the use of bags, with bougies, are their almost continuous action, freedom from laceration of the cervix, stimulation of uterine contraction, stimulation of mucous secretion in the cervix, and imitation, so far as possible, of the dilating action of a bag of water. In Pomeroy's double bag, the cervix and vagina both may be dilated by introducing sterile fluid into the two portions of the bag; by making traction upon the bag through its tube, increased dilating power is obtained and the whole birth-canal from the internal os is opened for the passage of the child.

When dilation by the use of bougies and bags has reached three-fourths of the capacity of the cervix, if the membranes are unruptured, it is well to remove the bougies and bags and allow the membranes to protrude through the cervix. The presence of bougies and bags sometimes disturbs the mechanism of labor, interferes with rotation, and may produce complications in the expulsion of the child. Hence, when labor has been thoroughly established and dilation three-fourths complete, it is well to remove the bougies and bags to give opportunity for the normal mechanism of labor. Strychnin, $\frac{1}{20}$ gr., with 30 drops of aromatic spirits of ammonia and 30 drops of brandy, will usually stimulate uterine contractions sufficiently.

If the operator has been unfortunate enough to rupture the membranes during induced labor, the use of the bags must be continued longer, and the largest size bags possible must be used to secure thorough dilation. The patient's suffering will be greater, labor will often be longer, the mechanism of labor altered, and the extraction of the child usually more difficult in these cases.

The Termination of Induced Labor.—Theoretically, induced labor terminates with the spontaneous expulsion of the child. Practically, induced labor is frequently terminated by some other obstetric operation, usually the application of forceps.

A reason for the failure of induced labor to end spontaneously lies in the tedious suffering which it imposes upon the patient. Uterine contractions caused by bougies are usually not violent, but are prolonged and tedious, disturbing her rest and wearying and dis-

couraging her. The use of bags causes great pain, and during their presence it is often necessary to give morphin in $\frac{1}{8}$ gr. doses to sensitive and excitable patients. The long and painful labor resulting from the use of bougies and bags wearies the patient and spontaneous labor fails. When, therefore, the obstetrician commences the induction of labor, he must be prepared to terminate it by some other obstetric operation to deliver the child. During induced labor the patient's strength must be preserved by the frequent administration of liquid food, by securing as much rest as possible under the circumstances, and by avoiding all unnecessary interference and disturbance. The use of an anesthetic in introducing the bougies and dilating the cervix is most useful in all patients who suffer acutely.

The Results of Induced Labor.—The copious literature of this subject furnishes papers giving the results of accurate observation. From these the frequency of induced labor may be estimated and its value as an obstetric operation. Williams,[1] in 5000 cases of labor, induced labor 11 times. The indications were diseases of the heart, preëclamptic toxemia, the presence of a dead fetus, polyhydramnios, infection, and overgrowth of the child. The mothers recovered. The cervix was slightly torn in 2 cases, uninjured in the remaining 9. The induction of labor was not practised for pelvic contraction. Möller,[2] in 21,066 births, found 80 cases of induced labor in the Copenhagen Clinic. Among these were 646 cases of pelvic contraction, which would bring the induction of labor once in 8.73 cases of contracted pelves. Among these patients the head presented in 67.5 per cent.; the breech in 32.5 per cent. In 14 cases in which the head presented the mechanism was unfavorable, and in 10 of these dilating bags were used during labor, thus illustrating the tendency of bags to interfere in the mechanism of labor; 52.5 per cent. of labors terminated spontaneously; 47.5 required other operation. The maternal mortality was 1.25 per cent.; the maternal morbidity 33.75 per cent. The mortality for

[1] Surgery, Gynecology, and Obstetrics, September, 1906.
[2] Archiv f. Gyn., Band 80, Heft 3, 1906.

the child was 18.75 per cent. The period most often chosen was the thirty-fifth week. One year after the operation it was found that 20 per cent. less of the children born by induced labor survived than among children born spontaneously. In cases where the induction of labor was practised later than the thirty-fifth week, the mortality among the children was increased. von Herff[1] had a fetal mortality of 20 per cent. in the induction of labor. He estimates the maternal mortality in induced labor at a rate fully as high as that of other major operations. Leopold,[2] in 14,094 births, induced labor for contracted pelves 87 times. In common with many German obstetricians he induced labor in cases having a comparatively small true conjugate, thus the range in the measurement of the true conjugate extended from 8.5 to 7.5 cm. In the smaller pelves the induction of labor was terminated by some other operation, usually hebotomy. He chose the thirty-fifth to the thirty-sixth week as the best period: 85 per cent. of the children were born living; 15 per cent. were stillborn. During the first ten days after birth 13 children, or 18 per cent. of the entire number, died; 69 per cent. of the children left the hospital in good condition. Labor was induced by bougies alone in 5 cases; bougies and bags in 12; Bossi's dilator and bag in 52, and the use of bags only in 15. The maternal mortality was 1.2 per cent.; maternal morbidity 28.5 per cent. Leopold has been especially interested in the fate of children born in premature labor. He investigated 353 cases and found at the end of the first year 20.9 per cent. of these had died. In the series of cases just mentioned 24.4 per cent. of the children did not survive the first year. Leopold believes that the operation has its distinct place, but should not be applied in cases of primiparæ with contracted pelvis. It finds its especial field in multiparæ where pelvic contraction is not extreme, and where patients have lost children in prolonged and difficult labor.

The Value of Induced Labor.—No subject is at present more debated than the indications for and the value of induced labor. It

[1] Monatsschrift f. Geb. u. Gyn., 1907, Band 24, Heft 6.
[2] Archiv f. Gyn., Band 81, 1907.

has lately come into competition with Cesarean section and pubiotomy, whose results are now so good as to challenge those of induced labor. In contracted pelves in primiparæ the majority of opinion among operating obstetricians to-day is against interference, if possible. Abundant statistics show that in large series of contracted pelves spontaneous labor occurs in 80 per cent. The mortality and morbidity for the children in these cases is surprisingly little. If cases of pelvic contraction can be brought under observation early in pregnancy, the mother's diet be regulated, she be made to exercise regularly, and her general vigor maintained, four-fifths of these cases will deliver themselves.

We are still without accurate methods of fetometry; in their absence our one reliable measurement of the comparative size of mother and child is the development of labor. In cases of extreme pelvic contraction this, of course, does not apply, but we are speaking of moderate pelvic contraction, in which the decision is most difficult. The development of labor has the advantage of bringing the child down from above into the pelvis, developing molding of the head and the accurate fitting of the presenting part into the pelvic cavity. No artificial method of delivery accomplishes this. In moderate pelvic contraction we cannot know that the head will not enter the pelvis until a reasonable time has elapsed, with uterine and abdominal contractions carrying the child downward.

In multiparæ with moderate pelvic contraction, with a history of disastrous labor, the induction of labor may be most valuable. Here the mother's mind will be greatly relieved to find that without an abdominal section she may have a child with every prospect of success. She will cheerfully submit to the necessary manipulations, and the indications seem all in her favor. It must not be forgotten, however, that in almost half of these cases delivery must be terminated by forceps or version. In cases where serious and progressive disease threatens the life of the mother, or where some diseased condition threatens the child, the induction of labor is most valuable. In these cases the child's life cannot be considered, and delay may be

practised to secure the gradual expulsion of the fetus with the least disturbance and risk to the mother.

The Induction of Labor as Preliminary to Other Operations.—The obstetrician is called upon to deal with cases where pregnancy may be interrupted with the hope that spontaneous labor will occur, but with the well-grounded fear that such will not be the case. With such patients the obstetrician must carefully weigh the circumstances and factors present. If the parents greatly desire a living child, should complications arise during induced labor threatening the child's life, the obstetrician must be prepared to deliver it as soon as possible in the safest and best way. Pubiotomy and forceps or Cesarean section may become indicated.

In induced labor great care must be given to antiseptic precautions. The fact that a second operation may be necessary to secure delivery renders it imperative that the birth-canal be maintained in an aseptic condition. Artificial dilation frequently causes slight lacerations of the birth-canal, which are an open door for the entrance of infection.

The Choice of Induced Labor.—In dealing with married patients with whom the life of the child has definite value, induced labor should not be advised as the safest operation for the infant. Its mortality rate for the mother should be stated to the parents, and also its mortality rate for children. The mortality rate of other operations for mother and child should also be stated, and among intelligent parents a decision advised may be given, supplemented by the choice of the patient and her husband. It seems but fair that obstetricians should state to patients, where such an important decision is to be made, their individual results of operations, thus giving a fair idea of what they can do for their patients.

The Care of the Child in Induced Labor.—As the child is to be premature, it will require especial attention in these cases. It is essential that the nurse be accustomed to the care of premature infants; the simplest and most efficient appliances for keeping the child warm should be in readiness. Usually for the first few days a basket

filled with hot-water bottles may be employed, after which, if desired, an incubator may be used. In winter a constant and appropriate source of heat, a sunny room, stimulants, and an abundant supply of fresh air are requisite. When it is possible, two nurses should have charge of mother and child, one to give her attention exclusively to the infant.

Fig. 22.—Incubator with child wrapped in cotton, surviving after a difficult forceps extraction.

The Induction of Labor for Fetal Deformity.—In these cases the life of the fetus is necessarily sacrificed, and the operator should be prepared to terminate the labor by embryotomy. In polyhydramnios the possibility of twin pregnancy should not be forgotten, and also the fact that the fetus is often malformed and shares the disease of the mother.

Bibliography of the Interruption of Pregnancy, Therapeutic Abortion, and the Induction of Labor

Baisch: Archiv f. Gynäkologie, Band 84, Heft 2, 1908.
Bokelmann: Graefes Sammlung, Band 7, Heft 6, 1907.

Bürger: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 27, Heft 6, 1908; Monograph Wien., 1908.
Chazan: Zentralblatt f. Gynäkologie, No. 3, 1909.
Chrobak: Zentralblatt f. Gynäkologie, No. 22, 1907.
Cooke: American Journal of Obstetrics, June, 1907.
Davis: Journal Amer. Medical Association, No. 8, 1909.
Discussion: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 24, Heft 4, p. 521, 1906; Zentralblatt f. Gynäkologie, No. 16, 1907.
Fraenkl: Medicin. Klinik, 1907; Zentralblatt f. Gynäkol., No. 31, 1907.
Franz: Deutsche m. Wochenschrift, No. 26, 1909.
Freitag: Inaug.-Dissert., Breslau, 1906.
Fritsch: Deutsche m. Wochenschrift, No. 47, 1908.
Grasser: Zentralblatt f. Gynäkologie, No. 25, 1909.
Hannes: Münchener med. Wochens., p. 1974, 1907.
Hense: Zentralblatt f. Gynäkologie, No. 29, 1908.
Hofmeier: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 59, Heft 2, 1907.
Jewett: American Journal of Obstetrics, vol. 55, p. 769, 1907.
Johnson: St. Paul Medical Journal, April, 1907.
Labourdette: Bull. de la Soc. d'Obst. de Paris, Nov., 1909.
Leopold and Conrad: Archiv f. Gynäkologie, Band 81, Heft 3, 1907.
Lobenstine: Bulletin of the Lying-In Hospital, New York, Sept., 1908.
Lucas-Championniére: Ann. de Gyn. et Obstet., Feb., 1909.
Maygrier: L'Obstetrique, No. 4, 1907.
Mueller: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 2, 1907.
Müller: Archiv f. Gynäkologie, Band 80, Heft 3, 1906.
Pinto: La Rassegna. d'Ostetr. e Ginec., vol. 16, pp. 129 and 300, 1907.
Planchu: Jour. of Obstet. and Gynecol. of British Empire, p. 269, 1907.
Pradella: Inaug.-Dissert., Zürich, 1906.
Rielander and Mayer: Archiv f. Gynäkologie, Band 87, Heft 1, 1909.
Rimmin: Monatssch. f. Geburtshülfe u. Gynäkol., Bd. 25, Heft 2, 1907.
Rissmann: Medicin. Klinik, p. 350, 1907.
Rosthorn: Monatssch. f. Geburtshülfe u. Gynäkol., Bd. 23, Heft 5, 1906.
Schmidt: Deutsche m. Wochenschrift, No. 24, 1909.
Tuszkai: Wiener med. Wochens., vol. 57, p. 1330, 1907.
von Herff: Monatssch. f. Geburtshülfe u. Gynäkol., Bd. 24, Heft 6, 1907; Münchener m. Wochen., No. 50, 1908; and Beiträge f. Geburtshülfe u. Gynäkol., Band 13, 1909.
Williams: Surgery, Gynecology, and Obstetrics, September, 1906.
Williamson: Journal of Obstetrics and Gynecology of the British Empire, March, 1906.

RAPID AND FORCIBLE DILATION OF THE WOMB

In direct contrast with the induction of labor, when we endeavor to follow Nature's methods in gradually softening and dilating the womb, is the rapid and more or less forcible dilation of the cervix. This is widely known by the appropriate term accouchement forcé.

Among the many dilators which have been used for this purpose the solid dilator is safest, but is not of sufficient size to open the womb sufficiently for delivery. Dilators with two blades are open to the same objection, and have the further disadvantage that they make pressure laterally where the blood-vessels enter the uterus, and that lacerations made by these instruments may be accompanied by severe hemorrhage. Dilators with numerous blades are less objectionable, as exerting pressure more equably upon the cervix.

Among bladed dilators in use at present Bossi's is most important and useful. The merits of this instrument are its length, its pelvic curve, the force which can be exerted by it, and its very gradual action, if used with caution.

Its disadvantages are the fact that the unaccustomed operator has little or no idea of the force exerted, and that severe and fatal lacerations may follow its use in any but the most careful hands. When brought to the full extent of its dilating power, it opens the cervix widely enough to permit the passage of a full-term head. Such dilation is exceedingly dangerous and should be avoided. When used up to the middle of its scale, or 6 cm., in skilful hands, it is not dangerous, and often serves a most useful purpose. In using the instrument the operator should consume at least from thirty to forty-five minutes in bringing the scale up to 6 cm. Pressure should be gradually exerted upon the cervix, and frequent examination should be made by the finger to determine that the dilator is in the proper position and that it is not causing severe laceration. If the latter occurs, there will be a trickling discharge of bright blood. Care should be taken to keep the instrument in the axis of the pelvis, which makes the liability to extensive tear least. As soon as possible during

dilation the guards should be slipped over the tips, making the danger of laceration considerably less.

Newell's dilator is smaller than Bossi's, shorter, and has the merit of depending entirely upon the power of the hand for its dilating force. It is often useful in securing partial dilation, and is much better than the ordinary two-bladed dilator.

Rapid dilation of the cervix under favorable conditions can be efficiently done by the fingers and hands. Harris's method, which consists in introducing the fingers in increasing numbers into the uterus and sweeping them around the cervix, may be employed, but whatever method be followed the operator must be careful not to push his hand in cone shape through the cervix; in so doing there is danger of lacerating the womb in the lower uterine segment. If two fingers of each hand turned in opposite directions can be hooked within the cervix and rotated in opposite directions, pulling gently downward and forward, the cervix will be dilated sufficiently without danger of rupturing the uterus. When the fingers can be introduced into the body of the uterus and closed, the thigh can often be grasped and the body of the fetus brought into the cervix. If it is necessary to introduce the entire hand, the cervix should be dilated as widely as possible, the hand folded as narrowly as it can be, and passed into the womb at the side of the promontory of the sacrum. The danger of rupturing the uterus will thus be less.

Elastic bags are too slow in their action to cause rapid dilation of the cervix. The attempt to secure this result with bags is often followed by the bursting of a bag and the escape of its contents partially within the womb. As none but aseptic fluid is to fill these bags, but little harm is done. Air, however, might thus be introduced, and the accident is an annoying one.

Where the cervix is unusually resisting, friable, and likely to tear extensively, it may be rapidly opened by multiple incisions. These should be made with blunt-pointed scissors in the four quadrants of the cervical ring, avoiding its two lateral portions. These cuts may extend nearly to the vaginal junction, and may be supplemented, if

necessary, by the use of an elastic bag, or by cautious dilation with the fingers. The method by incision is safer than the forcible dilation of the unaltered cervix by metal dilators or by the finger and hand; it is, however, not necessary where the cervix is softened and partially obliterated.

Among the minor operations of obstetric surgery, none may be more trying than the rapid dilation of the cervix. Where the cervix in a primiparous patient is not softened, not shortened, and rigid, it should not be dilated. Delivery in such a case must be effected, if necessary, by incision, vaginal or abdominal. The attempt to forcibly and rapidly dilate such a cervix will surely terminate in disaster.

The attempt to soften the unchanged cervix by hot vaginal douches or by the application of drugs is so uncertain, tedious, and inefficient that it has been discarded by expert obstetricians in favor of operation. Repeated hot vaginal douches, the placing against the cervix of wedges of cotton soaked in chloral solution or smeared with belladonna ointment, and the injection of cocain into the cervix have not given satisfactory results.

Should laceration occur during forcible dilation of the cervix, the operator should empty the uterus with the least possible danger to the mother. After delivery the laceration should be thoroughly examined, under anesthesia, to determine whether it has opened into the pelvic or peritoneal cavity. Unless it be unusually extensive and accompanied by vigorous hemorrhage, it may be successfully treated by packing with 10 per cent. iodoform gauze. The body of the womb should first be packed with gauze, the end of which is drawn out through the vagina. A separate strip should then be introduced through the laceration, so that the end projects for a considerable distance from the pelvic or peritoneal cavity. This packing should be moderately tight and should be kept separate from the uterine packing. The vagina should then be tamponed with bichlorid gauze. Strychnin and ergot should be given to maintain uterine contraction. The uterine packing should first be removed in forty-eight hours, the uterus irrigated with lysol (1 per cent.), the

vagina should be thoroughly sponged out with bichlorid solution (1 : 4000), the gauze packing in the laceration may then be removed and a new one inserted, using as little force as possible in its adjustment. This may remain forty-eight hours, when, in most cases, no further tampon is necessary. If the uterus be kept tightly contracted and a sterile vulvar dressing be used, such patients usually make a good recovery.

Tears of the cervix occurring during rapid dilation should be closed, if possible, as soon as the uterus is emptied. Tears extending into the vulva or peritoneal cavity are so high in the birth-canal that they cannot be efficiently reached from below and, hence, must be treated by tampon.

Bibliography

Bar: L'Obstetrique, No. 9, 1909.
Bardeleben: Zentralblatt f. Gynäkologie, No. 15, 1905.
Bonnaire: La Presse med., Nos. 66 and 67, 1909.
Bossi: Proceedings 16th International Congress, Budapest, 1909; also Gyn. Rundschau, No. 23, 1909.
Bunn: Zentralblatt f. Gynäkologie, No. 30, 1908.
Bürger: Zentralblatt f. Gynäkologie, No. 19, 1905.
Contiguera: Münchener med. Wochens., p. 2297, 1907.
Davis: Journal of Obstetrics and Gynecology, p. 502, 1907.
Edgar: Transactions of American Gynecological Society, 1908.
Eisenstein: Orvosi Hetilap, No. 27, 1907.
Frey: American Journal of Obstetrics, February, 1909.
Gauss: Proceedings 16th International Congress, Budapest, 1909.
Gheorghiu: Zentralblatt f. Gynäkologie, No. 42, 1907.
Graemiger: Inaug.-Dissert., Zürich, 1906.
Gröné: Svenska Läkartidningen, Nos. 35 and 36, 1907.
Guasoni: Zentralblatt f. Gynäkologie, No. 5, 1907.
Haindl: Inaug.-Dissert, Erlangen, 1906.
Jardine: British Medical Journal, July and August 24, 1907.
Jung: Deutsche. med. Wochens., No. 8, 1907.
Keyserlingk: Zentralblatt f. Gynäkologie, No. 24, 1907.
Klein: Deutsche. med. Wochens., p. 262, 1907.
Knapp: Surgery, Gynecology, and Obstetrics, September, 1906.
Leicester: Jour. of Obstet. and Gynecol. of British Empire, March, 1907.
Leopold: Monatsschrift f. Geburts. und Gynäkol., Bd. 22, H. 1, 1905.

Lewis: Jour. of Obstet. and Gynecol. of British Empire, p. 265, 1907.
Lichtenstein: Archiv f. Gynäkologie, Band 75, Heft 3, 1905; Zentralblatt f. Gynäkologie, No. 14, 1905.
Müller: Zentralblatt f. Gynäkologie, p. 320, 1907.
Pfannenstiel: Münchener m. Wochenschrift, No. 19, 1909; also Monatsschrift f. Geburtshülfe und Gynäkologie, Bd. 30, p. 630, 1909.
Schwabe: Inaug.-Dissert., Jena, 1906.
Sinclair: Jour. of Obstet. and Gynecol. of British Empire, Sept., 1905.
Somers: Western Medical Review, Omaha, 1909.
Weber: Archiv f. Gynäkologie, Band 82, 1907.
Wendell: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 6, 1907.
Winter: Proceedings 16th International Congress, Budapest, 1909.

OPERATION FOR APPENDICITIS

The frequent occurrence of appendicitis during pregnancy and the necessity for operation makes it necessary for the obstetrician to be familiar with the conditions which may be found in these cases. Perityphlitis in pregnancy is not uncommon. The chronic constipation of pregnancy favors the development of bacteria in the intestinal canal and explains the frequent occurrence of perityphlitis and appendicitis. The course of appendicitis in pregnancy will depend upon the period of gestation in which the condition arises. The anatomic peculiarities of the individual have an important part to play in determining the position of the appendix. Füth[1] endeavored, by taking casts of the abdominal organs in 7 pregnant women, to determine the position of the cecum and appendix. He found that this differed in each patient. In 100 cases Treves found the cecum and appendix under the liver in 18. Terenetzki in 65 bodies found the cecum higher than usual in one-third. In 200 subjects Schreferdecker found the cecum lower than normal in all but 2. Four locations of the cecum and appendix in pregnancy may be recognized as practically normal: First, near the crest of the ilium. Second, in the fossa of the ilium near the anteroposterior spine. Third, on the iliopectineal line. Fourth, near the umbilicus. I have seen during pregnancy, at about the third month, the appendix adherent to the

[1] Archiv f. Gyn., Band 76, Heft 3, 1905.

fundus uteri. It is probable that the growing uterus displaces the cecum at about the fourth month. The appendix is carried upward into the abdomen and this location makes inflammation of the cecum and appendix more than usually dangerous. After labor the cecum resumes its usual level, but if the appendix is adherent to the pelvic organs it accompanies them into the pelvis during involution.

The earlier the pregnancy the less dangerous is appendicitis. As pregnancy proceeds, the tendency is for infection to spread from the appendix to the surrounding tissues, and for adhesions to occur between the uterus and surrounding organs, so that a mass gradually forms, in which the appendix is the focus. Should the disease go to abscess formation, the inner wall of the abscess-cavity will be the uterus. Should the uterus discharge its contents prematurely, uterine contractions may burst the abscess wall, allowing infected material to escape into the peritoneal cavity. In cases where suppuration develops gradually, its tendency may be to extend toward Douglas' pouch, and if neglected, to open through this pouch into the vagina or, possibly, into the bowel. This is a favorable termination, and is one of the methods by which spontaneous recovery may occur. Before the fourth month the uterus fills the pelvis so completely that it is difficult for a considerable quantity of pus to find room in the pelvis.

As appendicitis is more dangerous as pregnancy proceeds, early operation is especially indicated. Even in mild cases the safer method requires the removal of the appendix in the absence of peritonitis and acute infection. The tissues should be subjected to the least possible disturbance, and in cases where the appendix is not ruptured drainage should not be used. Opium should be given for several days after the operation to prevent the premature emptying of the uterus.

In the later months of pregnancy, in chronic appendicitis, if there has been much fever, with or without chills, the obstetrician must suspect circumscribed abscess. Incision should be made over the point of greatest tenderness, the pus evacuated, with drainage, without disturbing the surrounding tissue. A cautious effort should be made

to find the appendix and, if possible, to remove it. If it cannot readily be removed, it should be laid freely open and allowed to slough away with the wall of the abscess. Free drainage with a soft-rubber tube, substituted later by strands of gauze, is indicated. The patient should be placed in Fowler's position and Murphy's instillation of saline fluid should be employed. Uterine contractions should be prevented, if possible, by the administration of opium.

Should pregnancy be interrupted after operation for appendicitis, the uterus should be emptied with the least possible manipulation. As septic infection may extend to the uterus, its cavity should be packed and drained with iodoform gauze (10 per cent.) for forty-eight hours after delivery. Should peritonitis develop, the abdomen should be opened sufficiently for a thorough examination, drains inserted in the most dependent portions, and salt solution freely used with stimulation.

It is difficult to give a mortality rate for appendicitis complicating pregnancy. The earlier the case is seen and the more promptly the appendix is removed, the better for the patient. The later the period of gestation in which appendicitis develops the greater the danger. Good judgment on the part of the operator in avoiding unnecessary manipulation will do much in lessening the mortality in severe cases.

Bibliography

Brindeau and Jeannin: Bull. de la Soc. d'Obstet. de Paris, No. 4, 1909.
Calmann: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 4, 1907; Münchener med. Wochens., No. 9, p. 441, 1907.
Coe: Surgery, Gynecology, and Obstetrics, July, 1905.
Croste: Thesis, Paris, 1906.
Cuff: British Medical Journal, July 4, 1908.
Davis: American Journal of Obstetrics, March, 1906.
Dupuys: Thesis, Lille, 1906.
Findley: American Journal of Obstetrics, December, 1909.
Fromm: Zentralblatt f. Gynäkologie, No. 18, 1908.
Füth: Archiv f. Gynäkologie, Band 76, Heft 3, 1905.
Halban: Wiener Klin. Wochens., No. 47, 1909.
Hilton: Surgery, Gynecology, and Obstetrics, October, 1907.

Hirschberg: Archiv f. Gynäkologie, Band 74, Heft 3, 1905.
Klein: Monatsschrift f. Geburtshülfe und Gynakologie, Band 24, Heft 5, 1906.
Kümmel: Münchener med. Wochens., No. 21, p. 1059, 1907.
Lindner: Archiv f. Gynäkologie, Band 82, p. 17, 1907.
Lobenstine: Bulletin of the Lying-In Hospital, New York, September, 1908.
Lockyer: Internat. Clinic, vol. 2, p. 177, 1907.
Mansfeld: Report of Gynecological Section of Association of Physicians at Budapest, p. 191, 1909.
Offergeld: Archiv f. Gynäkologie, Band 89, Heft 1, 1909.
Pinard: Annal. des. Gyn., p. 357, 1900.
Profanter: Wiener klin. Wochenschrift, No. 11, 1909,
Renvall: British Medical Journal, January 2, 1909.
Rodgers: Journal of American Medical Association, vol. 49, p. 2006, 1907.
Rumely: Inaug.-Dissert., Freiburg, 1906.
Runge: Berliner Klin. Wochenschrift, No. 27, 1907.
Stähler: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 2, 1907; Zentralblatt. f. Gynäkologie, No. 50, 1909.
Tissier and Lemeland: Zentralblatt f. Gynäkologie, Band 30, p. 533, 1907.
Vineberg: New York Medical Journal, Band 85, p. 880, 1907.
von Fellenberg: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 780, 1907.
von Rosthorn: Med. Klinik, Band 3, p. 339, 1907.
Weber: Deutsche Zeitschrift f. Chir., Band 93, Heft 3, 1907.

CHOLECYSTOTOMY IN PREGNANCY

As abscess of the appendix may require operation during pregnancy, so infection of the gall-bladder may call for incision and drainage. The symptoms of cholecystotomy complicating pregnancy are those usually observed. The growing distention of the transverse colon, so often seen in pregnant women, may obscure somewhat the diagnosis and make examination of the gall-bladder difficult. As pregnancy advances the abdominal viscera are pushed upward, and the gall-bladder is undoubtedly somewhat higher than in the non-pregnant and may be more difficult of access. In these cases efforts should be made to thoroughly empty the

intestines of solid, liquid, and gaseous contents before a positive diagnosis is made or operation undertaken.

Cholecystotomy in pregnancy differs in no essential way from the operation in the non-pregnant. The tendency of pregnant women to toxemia makes the occurrence of hemorrhage after operation more likely than usual, and the hemorrhage may be more profuse and dangerous. The interruption of pregnancy should be prevented if possible. If these dangers can be avoided the operation should give good results in pregnant women. After the operation every effort should be made to avoid acetonemia, as the overburdened condition of the liver in pregnancy would especially favor such an occurrence after prolonged anesthesia.

Bibliography

Acconchi: Annali di Ostetricia, No. 3, 1906.
Andrews and Blacker: Journal of Obstetrics and Gynecology of the British Empire, November, 1908.
Brook: British Medical Journal, June 16, 1906.
Calderini: Annal. des Gyn., Second Series, vol. 4, p. 428, 1907.
Christiani: Zentralblatt f. Gynäkologie, No. 15, 1905.
Cuff: British Medical Journal, July 4, 1908.
Davis: Bulletin of the Lying-In Hospital, New York, June, 1905.
Kühn: Frauenärtz, Heft 10, p. 434, 1909.
Leicester: Jour. of Obstet. and Gynecol. of British Empire, April, 1905.
Peterson: Trans. Amer. Gyn. Soc., 1910.
Poncet: Gazette des. Hôp., vol. 79, May 31, 1907.
Rissmann: Zentralblatt f. Gynäkologie, No. 20, 1909.
Roith: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 4, 1909.
Ross: American Journal of Obstetrics, April, 1909.
Schoenborn: Monatssch. f. Geburts. und Gynäkol., Bd. 29, Heft 1, 1909.
Thévenot: Revue de Chir., September, 1906.

OPERATIONS UPON THE KIDNEYS DURING PREGNANCY

Pyelitis from infection by the Bacillus coli communis is not uncommon during pregnancy. Fortunately for the patient it usually runs a comparatively mild course, and very seldom requires

surgical treatment. Should surgical kidney develop, nephrotomy or nephrectomy would be indicated, as in other cases.

In eclampsia, Edebohls urged and practised decapsulation of the kidneys. His operation consisted in exposing the kidney, incising its capsule along the convex border, and allowing the kidney substance to escape. This operation has been performed by others, and in some cases the function of the kidneys has been resumed and patients have apparently improved. Edebohls urged its performance in threatened eclampsia, where other methods to secure elimination had failed, in the presence of eclampsia where other methods had caused no improvement, in cases of nephritis not advanced, and in interstitial changes where kidney failure seemed imminent through engorgement. The operation has not been performed sufficiently often to give an accurate judgment as to its value. It is justifiable for the conditions described. In these the operation is without mortality, while it is difficult to estimate its morbidity.

Bibliography

Adrian: Deutsche med. Wochens., Band 33, p. 2024, 1907.
Balloch: Surgery, Gynecology, and Obstetrics, March, 1908.
Barth: Deutsche med. Zeitschrift f. Chir., Band 85, 1907; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 5, 1907.
Cragin: Surgery, Gynecology, and Obstetrics, May, 1906.
Cumston: American Journal of the Medical Sciences, July, 1908.
Falgowski: Zentralblatt f. Gynäkologie, No. 2, 1908.
Ferguson: Journal of Obstetrics and Gynecology of the British Empire, March, 1907.
Frank: Münchener med. Wochens., No. 51, p. 2471, 1907.
French: British Medical Journal, May 2, 1908.
Funck-Brentano: Ann. de Gyn. et Obstet., April, 1909.
Gauss: Zentralblatt f. Gynäkol., No. 19, p. 521, 1907, and No. 19, 1908.
Germain: La Ginecologie, July, 1909.
Hicks: British Medical Journal, vol. i, p. 203, 1909.
Kalmanowitsch: Gyn. Helvet. Frühjahrsausgabe, p. 187, 1909.
Kleinertz: Zentralblatt f. Gynäkologie, No. 26, 1908.
Milligan: Jour. of Obstet. and Gynecol. of British Empire, Feb., 1906.
Mirabeau: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 6, 1907; Archiv f. Gynäkologie, Band 82, 1907.

Newell: Boston Medical and Surgical Journal, vol. 156, p. 241, 1907.
Piéri: Annal. de Gyn. et d'Obstet., vol. 4, Series 2, p. 257, 1907.
Pinard: Annal. de Gyn. et d'Obstet., April, 1906.
Polano: Zentralblatt f. Gynäkologie, No. 1, p. 13, 1907, and No. 1, p. 14, 1908.
Puech: Bull. de la Soc. d'Obst. de Paris, Nov., 1909; also No. 5, p. 233, 1909.
Schumacher: Inaug.-Dissert., Bonn, 1905.
Sippel: Zentralblatt f. Gynäkologie, No. 37, 1905, and No. 51, p. 1586, 1907; Münchener med. Wochens., No. 44, p. 2173, 1908; Berliner klin. Wochens., No. 49, p. 1559, 1908.
Smith: Jour. of Obstet. and Gynecology of British Empire, Aug., 1905.
Sondern: Bulletin Lying-in Hospital, New York, No. 1, 1909.
Stoeckel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 28, Heft 5, 1908; Zeitschrift Gyn.-Urol., Heft 1, Band 1, 1908.
Vineberg: American Journal of Obstetrics, June, 1908.
von Herff: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 24, Heft 6, 1906.

ABDOMINAL SECTION DURING PREGNANCY

The presence of tumors in the abdomen, the occurrence of gunshot or incised wounds, rupture of the abdominal viscera by accident, intussusception, rapid growth of malignant disease attacking the intestines, development of tubercular peritonitis and other conditions may call for abdominal section during pregnancy. An enlarged dislocated spleen has been successfully removed without the disturbance of gestation. Abdominal section during pregnancy may be undertaken with fair prospect of success, in spite of the existence of pregnancy. The operator must disturb the tissues as little as possible to avoid the interruption of gestation. If the fetus be viable and the mother's condition critical, it may be justifiable to include in the abdominal section the emptying of the uterus by uterine section. This avoids the risks occasioned by uterine contraction when the uterus expels its contents prematurely after abdominal section, and enables the operator to see accurately what the intra-abdominal conditions will be after the uterus is emptied. It also gives the child the best chance for life; the removal of the child by uterine incision can be done so quickly and with so little

Daniel
336 Centre Street
Jamaica Plain,

shock to the mother that it would not militate against her in any complicated case. The increased vascularity of the abdominal tissues, especially in the neighborhood of the uterus, may cause embarrassing hemorrhage. Fluid may also be found in the abdominal cavity as the result of pressure by the growing womb.

Bibliography

Chevannaz: Jour. de med. de Bordeaux, vol. 37, p. 101, 1907.
Connel-Scheffield: Journal of Obstetrics and Gynecology of the British Empire, vol. 10, No. 2, 1907.
Meek: British Medical Journal, vol. 1, p. 928, 1907.
Neu: Archiv f. Gynäkologie, Band 80, Heft 2, 1906.
Pfannenstiel: American Journal of Obstetrics, August, 1908.
Reynolds: American Journal of Obstetrics, August, 1908.
Schauta: Zentralblatt f. Gynäkologie, No. 14, 1908.
Tixier: Lyon Méd., No. 40, 1906.
Zachen: Inaug.-Dissert., Leipsic, 1907.

OPERATION FOR ECTOPIC GESTATION

By ectopic gestation we now understand the development of the embryonic ovum outside the cavity of the womb.

This may occur in the uterine wall at its cornu, in the Fallopian tube, in the ovary, and in the pelvic or abdominal cavity. The extent to which the development of the embryonic ovum will proceed must depend upon the site of its attempt to develop. Thus, in the uterine cornu, chorionic tissue will make its way through the uterus, causing rupture of the uterine muscle and hemorrhage. In the Fallopian tube, the envelope of the embryo must rupture after a few months' gestation. In the ovary its rupture must occur very early, for ovarian pregnancies have not been found far advanced. When the embryonic ovum remains in the abdominal cavity, if planted upon suitable material, it may grow very nearly to full term.

A few years ago there seemed no question but that the presence of an ectopic gestation demanded operation as soon as the diagnosis was made. Those who urged this view cited the dangers of

hemorrhage and shock as sufficient reason for immediate operation. Champneys' observations upon hospital patients who were kept in bed under observation, but without operation, showed that a very considerable proportion of cases of ectopic gestation, ruptured and unruptured, recovered without interference. These patients did not regain their accustomed health as soon as did those

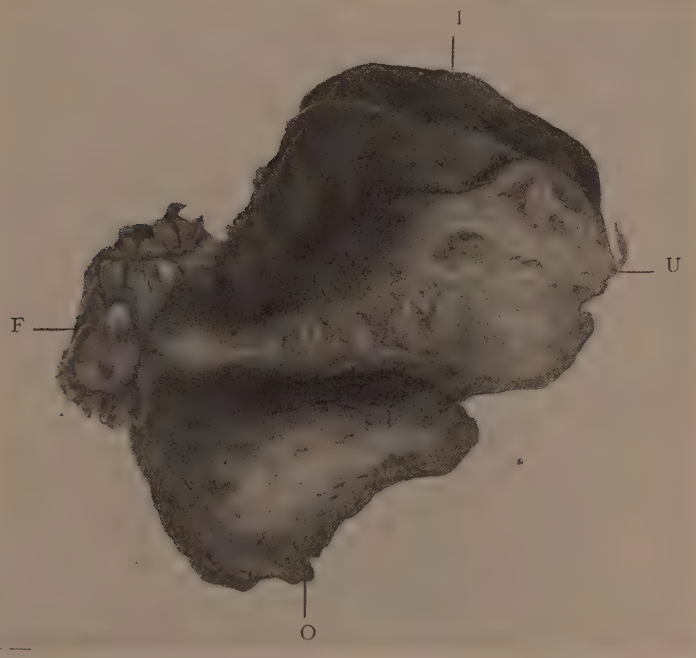

Fig. 23.—Tubal pregnancy (isthmic), unruptured: F, Fimbriated extremity; U, uterine extremity of tube; O, ovary; I, tube cut, showing gravid sac in isthmic portion. (Ladinski, in American Journal of Obstetrics.)

subjected to operation, but they did not die from hemorrhage or shock. Robb's recent paper before the American Gynecological Society Transactions, Vol. 32, 1907, describes experiments upon animals in which the pelvic blood-vessels were severed, with the recovery of the animals from profuse hemorrhage. The clinical experience of obstetricians embraces cases where it seems as if immediate operation turns the tide, through shock, against the patient. In America,

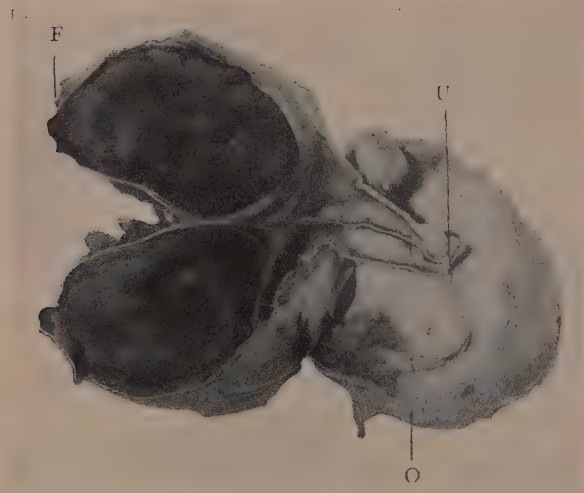

Fig. 24.—Tubal pregnancy (infundibular), unruptured. Tube cut through: F, Fimbriated extremity; U, uterine extremity; O, ovary. (Ladinski, in American Journal of Obstetrics.)

Fig. 25.—Same specimen as Fig. 24. Tube intact. (Ladinski, in American Journal of Obstetrics.)

especially, as well as in Europe, the discussion has again arisen as to whether all cases of ectopic gestation should be subjected to immediate operation.

It is recognized that all cases of ectopic gestation recover more completely and permanently if subjected at some time to operation. The majority of opinion in the American Gynecological Society[1] was as follows:

The judgment of the individual operator must decide between immediate and deferred operation in each case. Obviously, without adequate assistance and appliances for asepsis operation should not be undertaken. Few operators, however, would go to such a case without the necessary assistance and appliances for operation.

Fig. 26.—Uterine cast. (Ladinski, in American Journal of Obstetrics.)

Fig. 27.—Uterine cast. (Ladinski, in American Journal of Obstetrics.)

As obstetric surgery advances we are able more and more to control the patient's environment.

Preparations should be made for operation in all cases of ruptured ectopic gestation. If the patient is shocked, but shows a tendency to improve, the pulse slowly regaining and the nervous system acquiring a better tone, although prepared to operate, the operator should wait, if possible, until the patient is in fair condition for operation. If, when preparations for operation have been

[1] Transactions, vol. 33, 1908.

completed, she shows no sign of improvement, but is growing steadily worse, operation is the patient's only hope.

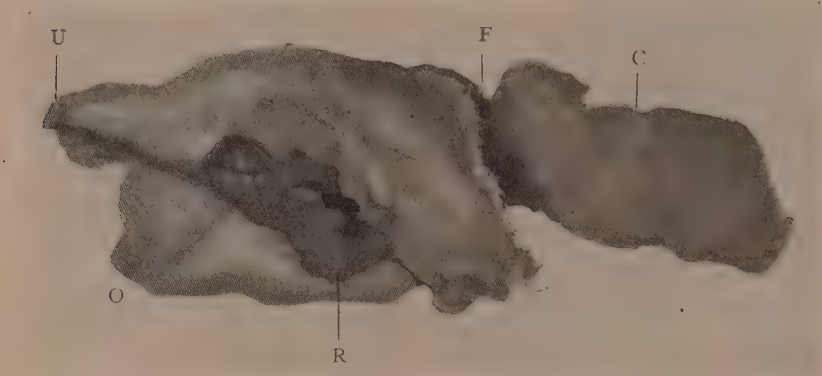

Fig. 28.—Simultaneous tubal abortion and rupture: U, Uterine extremity; F, fimbriated extremity; O, ovary; R, rupture in tube wall; C, coagulum expelled from ostium abdominale. (Ladinski, in American Journal of Obstetrics.)

Fig. 29.—Threatened tubal abortion with slight bleeding from fimbriated extremity: U, Uterine extremity of tube; F, fimbriated extremity; O, ovary. (Ladinski, in American Journal of Obstetrics.)

Transfer to hospital is sometimes dangerous in these cases because moving the patient may loosen a blood-clot in the abdomen and set

up fresh hemorrhage. On the contrary, hospital facilities are so superior that if transportation can be effected with gentleness and

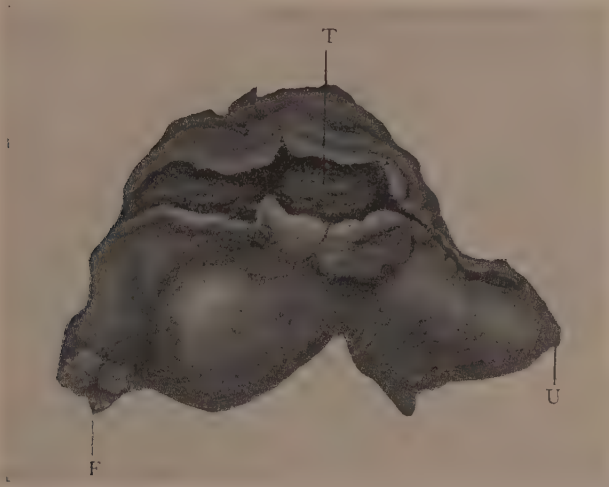

Fig. 30.—Complete tubal abortion: U, Uterine extremity; F, fimbriated extremity; T, tube cut, showing engorged mucosa. (Ladinski, in American Journal of Obstetrics.)

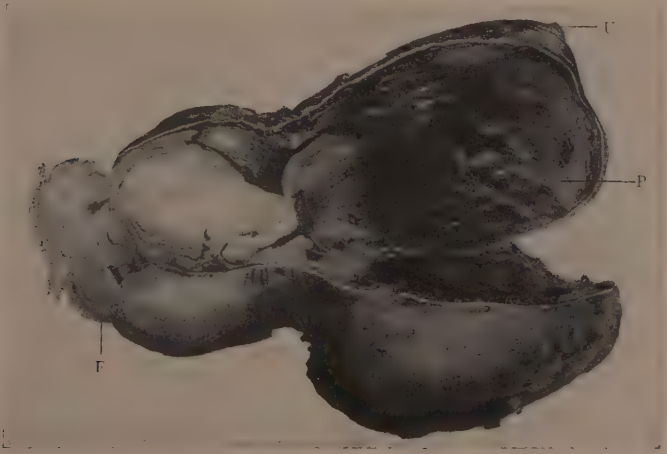

Fig. 31.—Incomplete tubal abortion with fetus about to escape into peritoneal cavity, also showing thinning and distention of tube wall: U, Uterine extremity; P, distended tube wall cut, showing placenta; F, fetus protruding from ostium abdominale. (Ladinski, in American Journal of Obstetrics.)

rapidity, the patient's surroundings at home being unfavorable, it should certainly be done. In no branch of obstetric surgery is

better judgment demanded, and in no cases are the life-saving effects of operation so clearly demonstrated.

Operation in ruptured ectopic gestation should be as simple as possible: incision, the finding of the point of rupture, securing the ruptured and bleeding viscus, and the rapid closure of the abdomen are the essentials. While the obstetrician's instinct would lead him to empty the abdominal or pelvic cavity of blood-clot, it

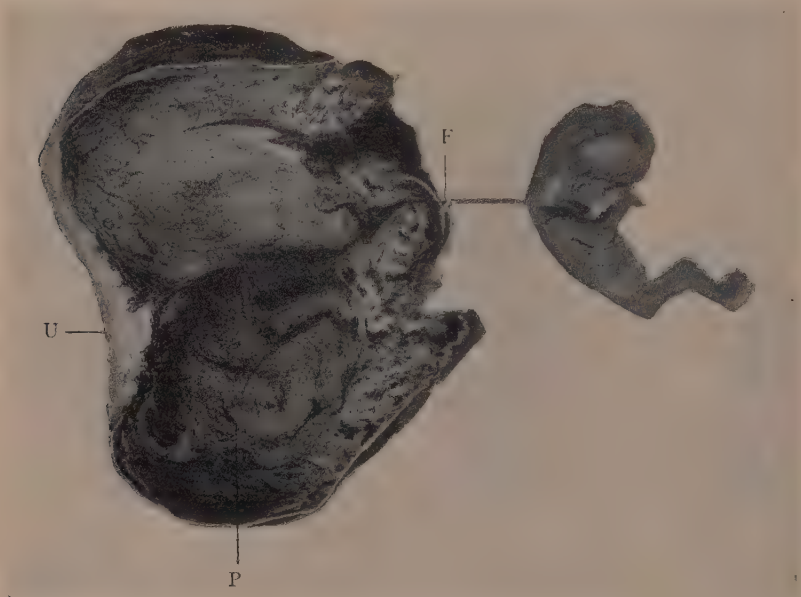

Fig. 32.—Incomplete tubal abortion, with fetus in abdominal cavity: U, Uterine extremity of tube; F, ostium abdominale patulous; P, placenta. (Ladinski, in American Journal of Obstetrics.)

may be safer to allow it to remain. Its presence favors infection, but its complete removal would take time, exposing the patient to added shock, and would deprive her of something which might be absorbed to some advantage. In desperate cases the arm should be prepared and intravenous saline transfusion done by an assistant while the operator opens the abdomen.

In unruptured ectopic gestation the obstetrician should avoid examinations conducted with considerable force, lest the envelope

of the embryo be ruptured. Operation should be undertaken as soon as the diagnosis is made if the circumstances surrounding the patient are favorable.

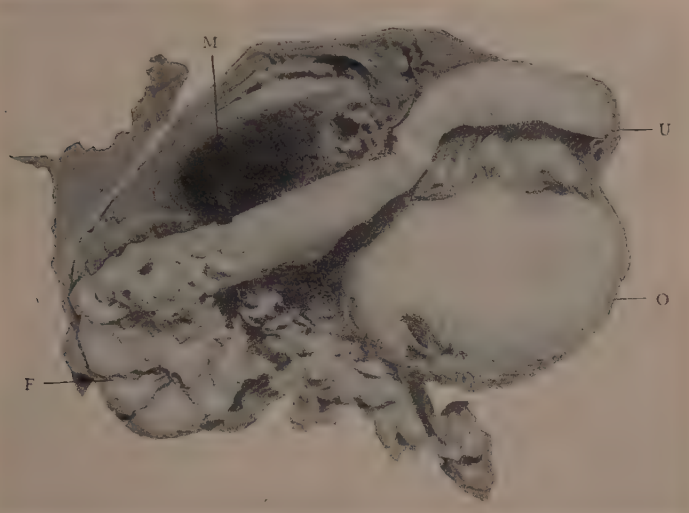

Fig. 33.—Tubal abortion terminating in mole, still present in tube: U, Uterine extremity of tube; F, fimbriated extremity of tube; O, ovary; M, mole in tube. (Ladinski, in American Journal of Obstetrics.)

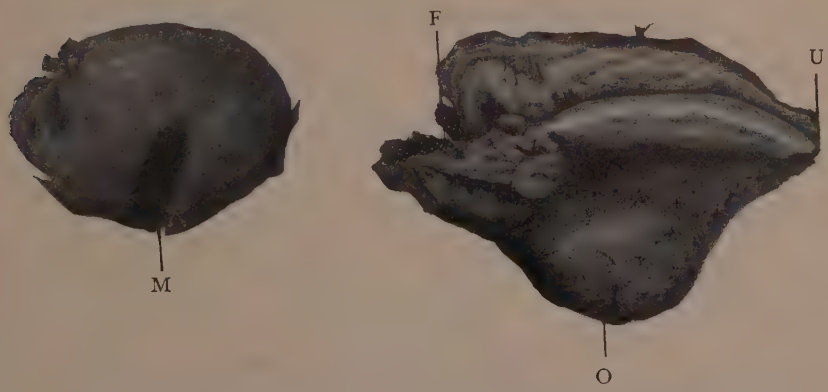

Fig. 34.—Tubal abortion terminating in mole, with mole discharged into peritoneal cavity: U, Uterine extremity of tube; F, fimbriated extremity of tube; O, ovary; M, mole in peritoneal cavity. (Ladinski, in American Journal of Obstetrics.)

In ectopic gestation which has ruptured some time before the patient comes under observation, conservative procedures will

usually be most successful. If the pelvis contains a large hematocele it may be opened through the posterior vaginal vault, clot

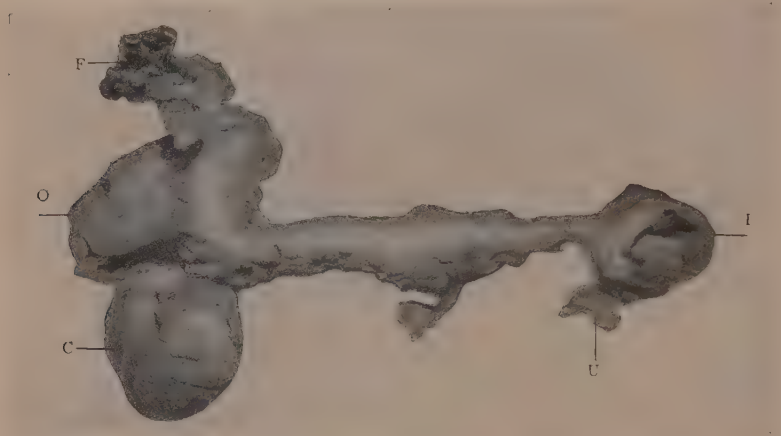

Fig. 35.—Ruptured tubal pregnancy (very early isthmic): U, Uterine extremity of tube; I, ruptured isthmic portion of tube; F, fimbriated extremity of tube; O, ovary; C, corpus luteum of pregnancy discharged from ovary. (Ladinski, in American Journal of Obstetrics.)

evacuated, and the cavity drained. In abdominal pregnancy the fetus and the cord should be removed, the cord ligated close to

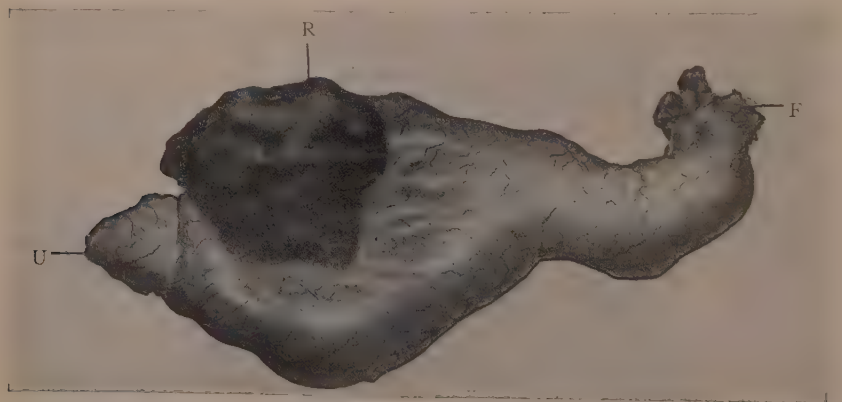

Fig. 36.—Ruptured tubal pregnancy (isthmic): U, Uterine extremity of tube; F, fimbriated extremity; R, ruptured isthmic portion of tube. (Ladinski, in American Journal of Obstetrics.)

the placenta, the cavity occupied by the fetus tamponed with gauze, and the placenta allowed to come away gradually. Under only

exceptional circumstances can a full-formed placenta be removed in ectopic gestation without a severe and dangerous hemorrhage. In cornual pregnancy the uterine cornu should be excised and the tube on that side removed. In tubal pregnancy the tube which contained the ovum should be removed, and in ovarian pregnancy the ovary should be taken away. In the case of a lithopedion, patients sometimes display a curious reluctance to part with the fetus. Its envelope should not be disturbed if the patient finally consents to operation.

Fig. 37.—Ruptured tubal pregnancy (infundibular) with very little hemorrhage: U, Uterine extremity of tube; F, fimbriated extremity of tube; O, ovary; R, rupture in infundibular portion of tube. (Ladinski, in American Journal of Obstetrics.)

In operating for ectopic gestation, unruptured or ruptured, some time before operation, the patient being in no immediate danger, the opportunity should be utilized to examine the uterine appendages on the side opposite to the site of implantation. Diseased Fallopian tubes should be removed, and thus the patient spared possible danger of the recurrence of ectopic gestation. In bicornate uterus ectopic gestation may be exactly simulated by pregnancy in one cornu. Should the uterus be rudimentary, a pregnant cornu will rupture as the fetus grows, and the patient be subjected to

the dangers usual in ectopic gestation. The cornu should be treated as the fetal sac and removed. The frequency of repeated ectopic gestation is estimated by Ham at 1 in 54; Wertheim, 7 to 8 repeated cases in 120; Küstner, 5 in 116; Dührssen, 2 in 37; Ryser, 4 in 50; Reifferscheid, 2 in 40; Orthmann, 2 in 45; Heikel, 4 in 80; Hörmann, 5 in 125. Although these figures differ widely, they are the result of considerable experience, and show that repeated ectopic gestation is not uncommon.

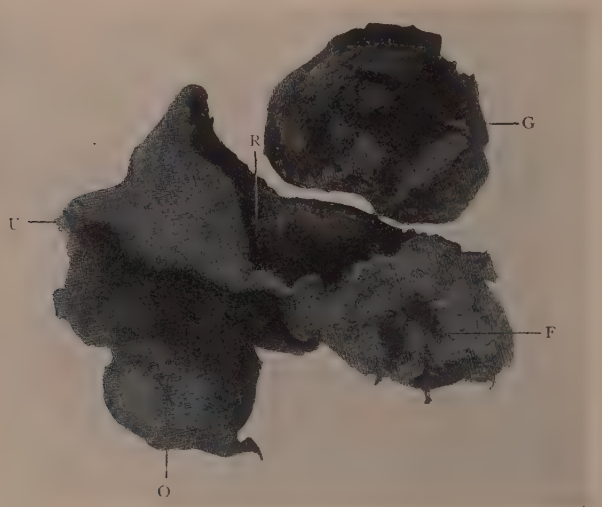

Fig. 38.—Tubal pregnancy with very large rent of tube: U, Uterine extremity of tube; F, fimbriated extremity of tube; O, ovary; R, rupture of tube wall; G, gestation sac expelled into peritoneal cavity. (Ladinski, in American Journal of Obstetrics.)

In cases where ectopic gestation has not proved immediately fatal, and suppuration has occurred in the mass surrounding the embryo, operation should consist in incision and drainage. Nothing more should be attempted until the cavity has grown as small as possible and nothing but a sinus remains. Such will usually close spontaneously with the simplest treatment; free motion on the part of the patient seems useful in bringing about such a closure. In dealing with obscure cases of irritation of the bladder and rectum, the obstetrician must not forget the possibility of ruptured suppu-

rating ectopic pregnancy and its discharge into one of these viscera. Fetal bones have made their way into the bladder and

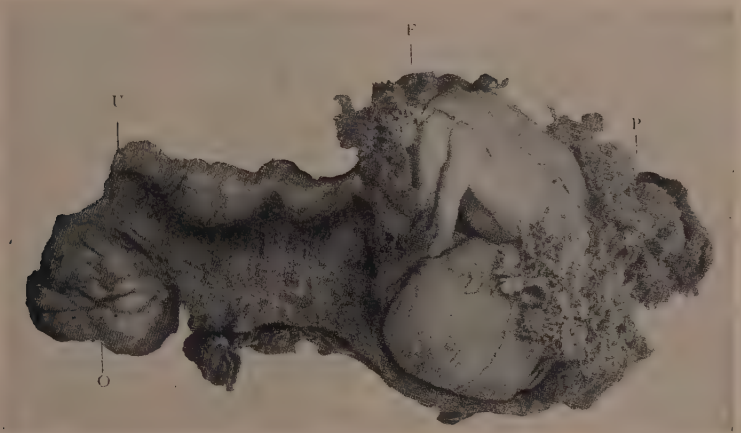

Fig. 39.—Infundibular tubal pregnancy with rupture terminating in tubo-abdominal, with final rupture into peritoneal cavity: U, Uterine extremity of tube; F, fimbriated extremity of tube; O, ovary; P, placenta attached to intestines and omentum. (Ladinski, in American Journal of Obstetrics.)

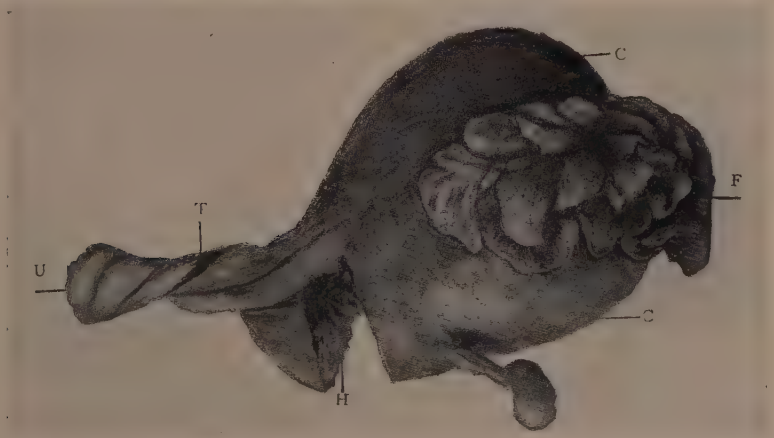

Fig. 40.—Torsion of tube with formation of tubal hematoma and hemorrhage into pelvic cavity: U, Uterine extremity of tube; F, fimbriated extremity of tube; T, twists of tube; C, cyst in infundibular portion of tube; H, hematoma of tube showing section removed for microscopic examination. (Ladinski, in American Journal of Obstetrics.)

occasioned irritation, and fetal débris has been discharged into the rectum. Dilation of the urethra, followed by the removal of the

foreign bodies, caused a cystitis to disappear. It is usually best not to attempt to open up fistulous tracts in these cases, as they will close spontaneously if time be given.

While we believe that all cases of ruptured ectopic gestation should not be subjected to operation as soon as they are seen, we must not forget that statistics abundantly show that a patient having ectopic gestation recovers more completely and satisfactorily under operation than by any other treatment. Operation, then, remains the only justifiable treatment for ectopic gestation. The exact time and circumstances under which it is to be applied must be left to the judgment of the individual operator.

Bibliography

Adjeroff: Wiener klin. Wochens., No. 51, p. 615, 1907.
Allwood: British Medical Journal, February 16, 1907.
Andrews: Zentralblatt f. Gynäkologie, No. 48, p. 1347, 1907.
Arnold: Lancet, June 1, p. 1490, 1907.
Audebert and Dieulafé: Annal. de Gyn. et d'Obstét., p. 472, August, 1907.
Baer: American Journal of Obstetrics, January, 1909.
Barnsby: Review of Gynecological and Abdominal Surgery, June, 1906.
Barrozzi: La Gynec., No. 6, p. 489, 1907.
Bell, Standage, and others: Discussion: Journal of Obstetrics and Gynecology of the British Empire, December, 1906.
Boldt: American Journal of Obstetrics, May, 1909.
Borszéky: Orvosi Hetilap, No. 3, 1907.
Bovée: American Journal of Obstetrics, p. 509, October, 1907.
Brindeau: Bulletin de la Soc. d'Obstét. de Paris, No. 9, p. 250, 1907.
Bucura: Wiener klin. Wochens., No. 4, 1907.
Chenot: La Gynéc., p. 481, December, 1907.
Child: American Journal of Obstetrics, January, 1907.
Cohn: Revue de Gynecologie, No. 1, 1909.
Costa: Annali di Ostetricia, vol. 1, p. 185, 1907.
Croissier: Ann. de Gyn. et d'Obstét., p. 688, November, 1907.
Discussion: American Gynecological Society, American Journal of Obstetrics, July, 1908.
Doederlein: Zentralblatt f. Gynäkologie, No. 11, p. 309, 1907.
Doldow: Inaug.-Dissert., Jena, 1906.
Döleris: La Ginecologia, November, 1909.

Donald: Journal of Obstetrics and Gynecology of the British Empire, vol. 2, Part 4, p. 365, 1907.
Eden: Transactions of the Obstetrical Society, London, vol. 43, Part 4, p. 272, 1907.
Elvrescht: American Journal of Obstetrics, p. 662, November, 1907.
Esch: Münchener m. Wochenschrift, No. 32, 1909.
Falk: Zentralblatt f. Gynäkologie, No. 43, p. 1306, 1907, and No. 45, p. 1404, 1907.
Finsterer: Zeitschrift f. Heilkunde, Band 28, 1909.
Fitzgerald: Lancet, November 23, p. 145, 1907.
Fleuront: Münchener med. Wochens., No. 37, 1906.
Ford: Surgery, Gynecology, and Obstetrics, July, 1906.
Frank: American Journal of Obstetrics, February, 1909.
Franz: Zentralblatt f. Gynäkologie, No. 7, p. 218, 1907.
Freund: Samml. klin. Vorträge, Heft 28, 1907.
Füth: Zentralblatt f. Gynäkologie, No. 43, 1905.
Galabin: British Medical Journal, March 21, 1903.
Goodall: British Medical Journal, June 2, 1906.
Gröné: Zentralblatt f. Gynäkologie, No. 2, 1909.
Grube: Zentralblatt f. Gynäkologie, p. 345, November 12, 1907.
Guerdjikoff: Ann. de Gyn. et d'Obstét., p. 585, October, 1907.
Haagn: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 6, 1905.
Hannes: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 21, Heft 3, 1905.
Harte: British Medical Journal, January 25, 1902.
Hayd: American Journal of Obstetrics, p. 657, November, 1907.
Heim and Lederer: Monatsschrift f. Geburtshülfe und Gynäkologie, Heft 1 and 2, 1907, and Band 25, Heft 2, 1907.
Henkel: Münchener med. Wochens., No. 27, p. 1344, 1907.
Herbert: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 3, 1909.
Hicks: British Medical Journal, February 8, 1908.
Hoehne: Zeitschrift f. Geburtshülfe u. Gynäkologie, Bd. 63, Hft. 1, 1909.
Hörmann: Annalen d. Städt. allgem. Krankenhaüser zu München, Band 12, 1900 and 1902.
Huggins: American Journal of Obstetrics, November, 1909.
Immel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 27, Heft 1, 1908.
Iwasse: Archiv f. Gynäkologie, Band 84, Heft 2, 1908.
Jarzeff: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 28, Heft 2, 1908.

Karczewskr: Medycyna, Polinsch., 1907.
Kelley: American Journal of Obstetrics, p. 481, October, 1907.
Küppenheim: Archiv f. Gynäkologie, Band 81, Heft 1, 1907.
Landau: Berliner klin. Wochens., No. 32, 1906.
Lassaud and Wertheim: Zentralblatt f. Gynäkologie, No. 9, p. 261, 1907.
Lehmann: Zentralblatt f. Gynäkologie, No. 46, 1909.
Leicester: Journal of Obstetrics and Gynecology of the British Empire, September, 1907.
Leo: Zentralblatt f. Gynäkologie, No. 36, 1909.
Lichtenstein: Zentralblatt f. Gynäkologie, No. 43, p. 1308, 1907.
Limnell: Archiv f. Gynäkologie, Band 81, Heft 2, 1907.
Lindequist: Hygiea, August, 1907.
Link: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 20, Heft 6, 1904.
Lovrich: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 27, Heft 6, 1908.
Lyle: Journal of Obstetrics and Gynecology of the British Empire, December, 1906.
MacLean: British Medical Journal, April 14, 1906.
Mantel: Ann. de Gyn. et d'Obstét., vol. 34, p. 84, 1907.
Maygrier: Bull. de la Soc. d'Obstét. de Paris, p. 234, Nos. 7 and 8, 1907.
McCalla: Surgery, Gynecology, and Obstetrics, March, 1909.
McDonnel: Australasian Medical Gazette, p. 287, June, 1907.
Mirabeau: Zentralblatt f. Gynäkologie, No. 49, 1905.
Mond: Zentralblatt f. Gynäkologie, No. 12, 1907.
Neugebauer: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 849, 1907.
Nowicki: Przeglad Lekarska, No. 7, 1907.
Nyulosi: British Medical Journal, p. 1570, November 30, 1907.
Oliver: Lancet, August 22, 1908.
Orthmann: Zentralblatt f. Gynäkologie, No. 49, pp. 1538 and 1542, 1907.
Phillips: Journal of Obstetrics and Gynecology of the British Empire, January, 1907.
Picard: Thése de Paris, 1908.
Platen: Zentralblatt f. Gynäkologie, No. 1, p. 26, 1907.
Polak: Long Island Medical Journal, March, 1909.
Prüsmann: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 52, Heft 2, 1904.
Puppel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 3, 1909.

Purslow: British Medical Journal, April 17, 1909.
Reed: American Journal of Obstetrics, February, 1906.
Reifferscheid: Deutsche med. Wochens., No. 40, p. 1665, 1907.
Ridont: Lancet, vol. 172, p. 805, March 23, 1907.
Rieck: Zentralblatt f. Gynäkologie, No. 12, p. 347, 1907; No. 30, p. 938, 1907; No. 35, p. 1049, 1907.
Robb: American Journal of Obstetrics, July, 1907, and vol. 52, p. 6, 1907.
Roberts: Transactions of the Obstetrical Society of London, vol. 48, Part 4, p. 309, 1907.
Rödiger: Zentralblatt f. Gynäkologie, No. 31, 1906.
Rutherford: Lancet, vol. 172, p. 881, March 30, 1907.
Sazbo: Archiv f. Gynäkologie, Band 82, 1907.
Scheffzeck: Archiv f. Gynäkologie, Band 83, Heft 2, 1907.
Scheffzek: Archiv f. Gynäkologie, Band 82, Heft 3, 1907.
Schumacher: Inaug.-Dissert., Bonn, 1907.
Seeligmann: Deutsche med. Wochens., No. 22, 1906; Zentralblatt f. Gynäkologie, No. 32, p. 985, 1907, and No. 12, p. 342, 1907.
Simpson: Surgery, Gynecology, and Obstetrics, November, 1907.
Sinclair: Journal of Obstetrics and Gynecology of the British Empire, April, 1907.
Sittner: Archiv f. Gynäkologie, Band 69, Heft 3, 1903; Deutsche med. Wochens., No. 30, 1906.
Stark: British Medical Journal, p. 1232, May 25, 1907.
Stillwagen: American Journal of Obstetrics, January, 1909.
Stoddart: Surgery, Gynecology, and Obstetrics, October, 1908.
Sturmdorf: Medical Record, January, 1909.
Sudeck: Münchener med. Wochens., No. 28, p. 1409, 1907.
Sutter: Zentralblatt f. Gynäkologie, No. 2, p. 62, 1907.
Tantzscher: Zentralblatt f. Gynäkologie, No. 27, 1908.
Tate: Transactions of the Obstetrical Society of London, vol. 49, Part 1, p. 51, 1907.
Tate, W. W. H.: Journal of Obstetrics and Gynecology of the British Empire, December, 1906.
Töth: Journal of Gynecological Section of Association of Physicians, Budapest, p. 101, 1909.
Valdagni: Journal of Obstetrics and Gynecology of the British Empire, June, 1905.
Van der Linder et Goetzbuer: Jour. de Chir. et Ann. de la Soc. Belge. de Chir., p. 282, November, 1907.
Van de Velde: Zentralblatt f. Gynäkologie, No. 17, 1909.
Vineberg: American Journal of Obstetrics, April, 1908.

Violet: La Ginecologia, No. 1, p. 63, 1909.
Webster: American Journal of Obstetrics, vol. 56, p. 73, 1907.
Weibel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 6, 1905.
Weinbrenner: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 24, Heft 3, 1906.
Weiss: Zentralblatt f. Gynäkologie, No. 8, p. 251, 1907, and No. 8, 1908.
Weisswanger: Zentralblatt f. Gynäkologie, No. 14, p. 383, 1907; Münchener m. Wochenschrift, No. 8, 1909.
Williams: Surgery, Gynecology, and Obstetrics, November, 1908.
Windisch: Zentralblatt f. Gynäkologie, No. 45, 1907.

PART II

THE SURGERY OF LABOR

The Extraction of the Child Through the Vagina

Indications.—The vaginal extraction of the fetus is safely possible only when the pelvis is of sufficient size to permit a given fetus

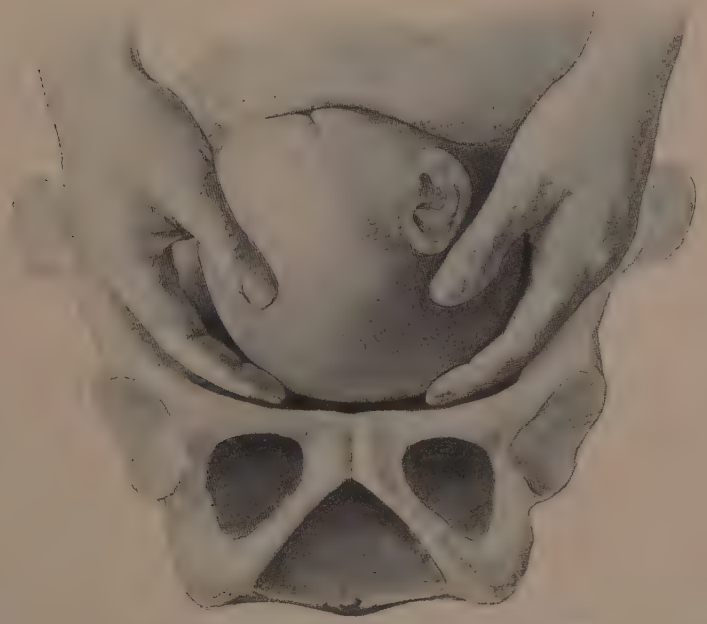

Fig. 41.—Head movable above the pelvic brim—the "floating head" (Bumm).

to pass through its channel. The effort at vaginal extraction in highly contracted pelves is usually fatal and, should death not result, is followed by high morbidity. Before undertaking vaginal extrac-

tion the obstetrician must be sure that the pelvis is sufficiently large to permit the passage of the fetus. In the early months of pregnancy this question scarcely arises, but after the sixth month it may be determined. Pelvimetry should be practised in all cases of vaginal delivery, supplemented by palpation of the pelvis. Unless the conditions are favorable for such examination the patient should be anesthetized before it is undertaken.

Fig. 42.—Head engaged in pelvic brim (Bumm).

The comparative size of mother and child should be ascertained by observing the presence or absence of engagement. This is the most valuable test which the obstetrician has concerning the relative size of mother and child. Its recognition, then, is of primary importance in deciding upon vaginal delivery.

To determine the presence or absence of engagement, the bladder should be completely emptied by catheter; if the lower bowel con-

tains an accumulation of feces, this should be removed. Unless the patient is a favorable subject for examination, she should be anesthetized with chloroform or ethyl chlorid. She should be placed across a bed or table and the thighs flexed upon the abdomen and the legs upon the thighs; the thighs should be rotated slightly outward. The obstetrician may then insert two fingers of one hand within the vagina, passing them directly back upon a line with the lower border of the symphysis pubis. If the head is engaged,

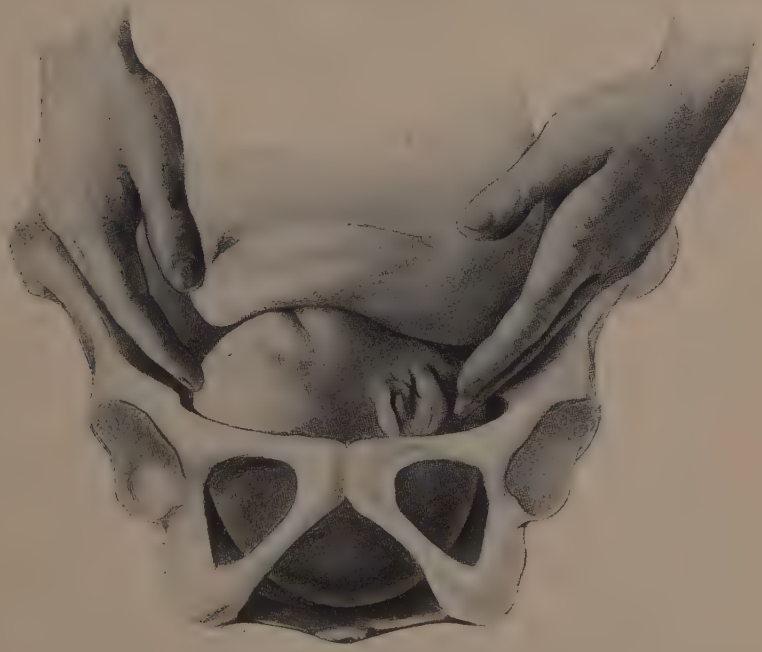

Fig. 43.—Head in pelvic cavity (Bumm).

his fingers will come against the head, which may or may not be still within the cervix. The upper portion of the vertex will be felt in occipital presentation. If the head is engaged, some portion of the sagittal suture will be recognized, the smaller fontanel usually found, and if flexion is not complete, the larger fontanel may often be reached. To determine whether the head is engaged only in the upper pelvis, or whether it has entered the pelvic cavity with any portion of its circumference, the fingers should seek the spines

of the ischia. When the head has descended to a line drawn between these spines, it has entered well into the pelvic cavity. Its successful passage through the pelvic cavity is, in the majority of cases, possible. If the head has not reached this point, the obstetrician must then determine whether or not he is dealing with a true engage-

Fig. 44.—Anterior parietal presentation (Kerr).

ment and descent of the head, or whether, in occipital presentation, labor has resulted in a presentation of a parietal bone. When this occurs, the head rotates upon its anteroposterior diameter, and a parietal bone passing downward and forward occupies the greater portion of the space at the pelvic brim. If expulsive action is

vigorous and there be disproportion, the head may become fixed in this position and impaction result. This condition is sometimes mistaken for engagement, and the application of the forceps is made with disastrous consequences. Successful engagement in vertex presentation requires descent of the vertex with the smaller

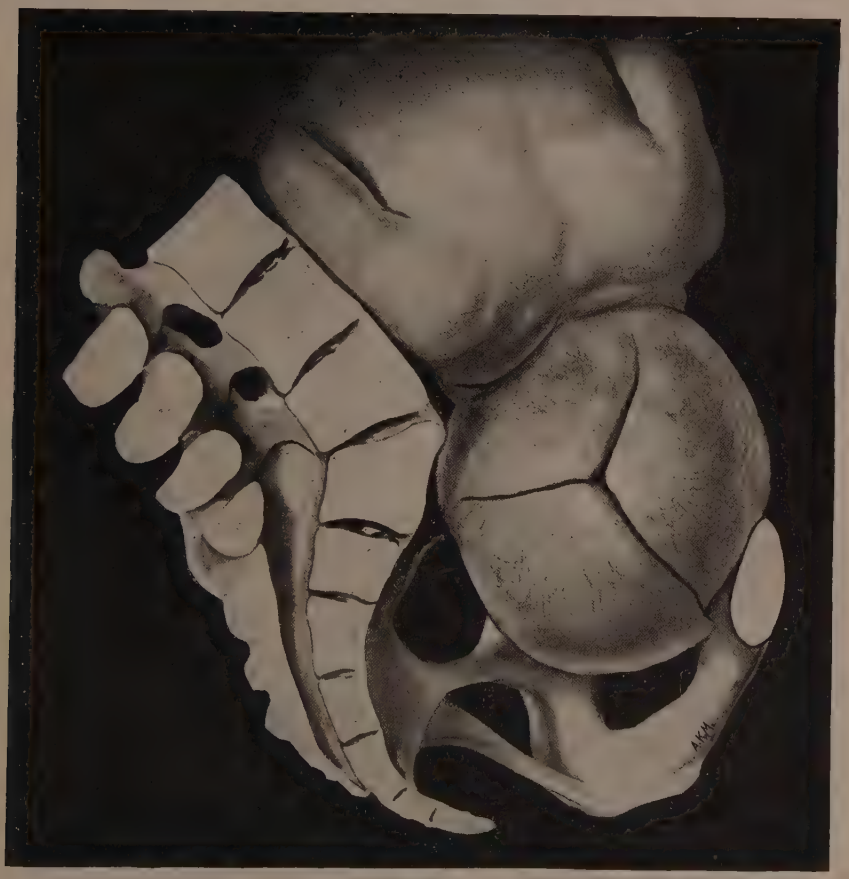

Fig. 45.—Posterior parietal presentation (Kerr).

fontanel, and the engagement of the head with the biparietal diameter in one of the oblique diameters of the pelvic brim.

Brow presentation may also be mistaken for favorable engagement (Fig. 48) the descent of the forehead being mistaken for one of the parietal bones, or for the vertex in face presentation (Fig. 49). The distance of the chin from the pelvic floor and the degree to

which the face can be palpated will determine the degree of engagement present. In occipitoposterior cases engagement is deter-

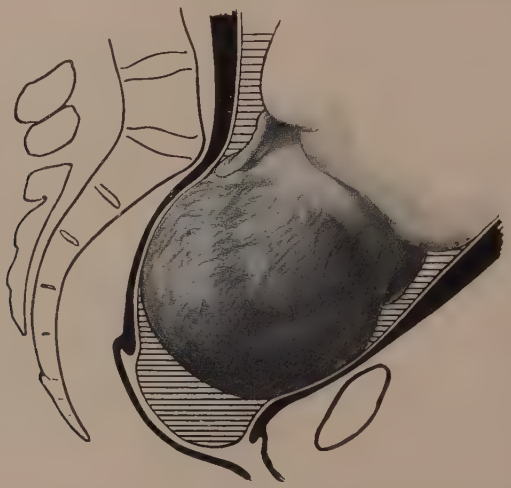

Fig. 46.—The engaged head and amniotic liquid in normal pelvis (Bumm).

mined by the distance of the posterior fontanel from the pelvic floor and the position of the sagittal suture. In breech cases engage-

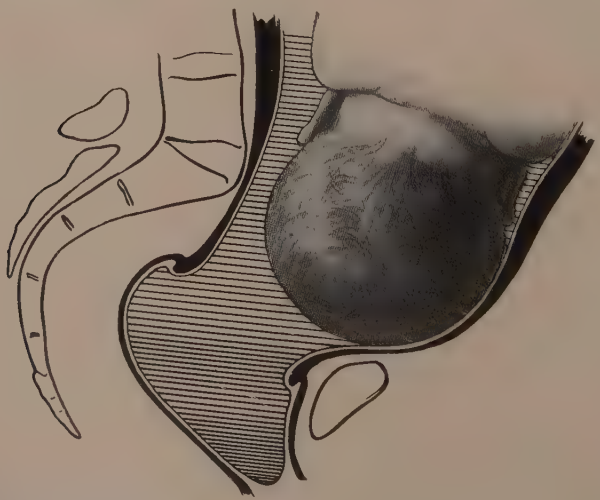

Fig. 47.—The unengaged head and amniotic liquid in contracted pelvis (Bumm).

ment is not complete until the obstetrician can reach with his fingers one of the child's groins.

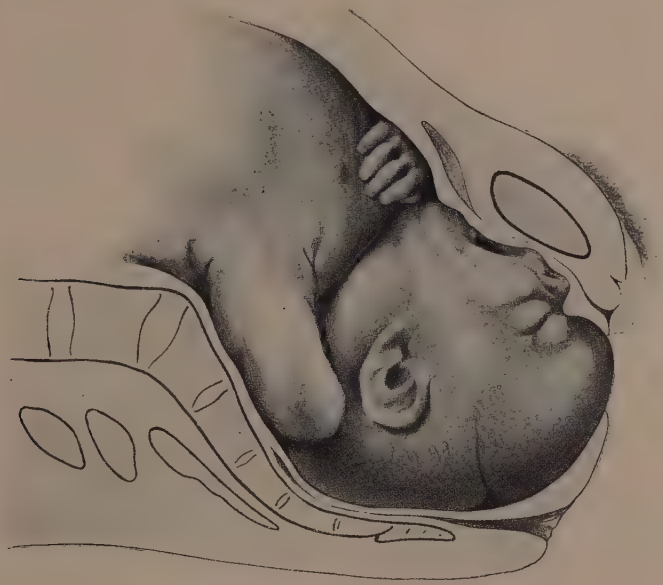

Fig. 48.—Labor in brow presentation (Bumm).

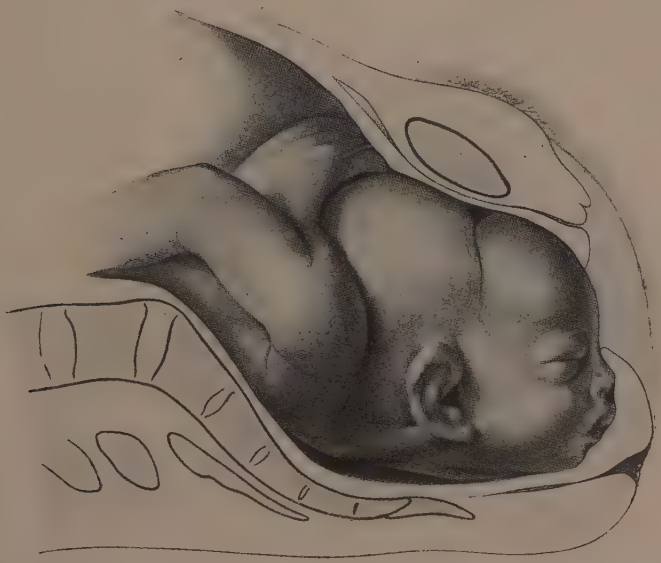

Fig. 49.—Face presentation—posterior rotation of the chin (Bumm).

The importance of the recognition of engagement with beginning or partial descent can scarcely be overestimated in cases requiring artificial vaginal delivery. Error in this must result in

the death of the child, and in the serious laceration, and even death, of the mother.

While engagement and descent may not be present at the time of examination, they may still occur where disproportion is absent if the patient receives proper treatment, and vaginal delivery may still become possible. In prolonged labor, if the patient's bladder be frequently emptied, if the rectum be empty, if she be turned upon the

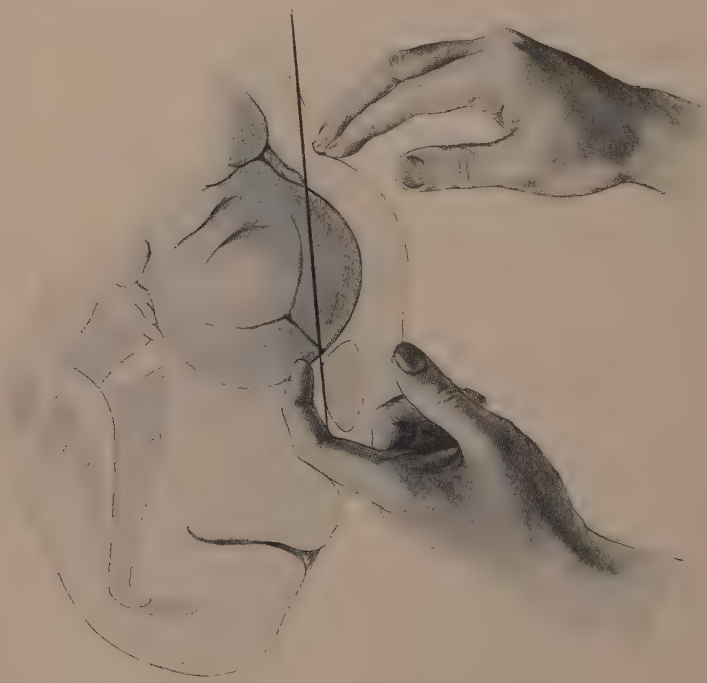

Fig. 50.—Müller's method of endeavoring to fit the head into the pelvis in contracted pelvis (Bumm).

side toward which the child's back is directed, if she be given liquid food sufficiently often and tonic doses of strychnin and brandy, engagement and descent may occur and vaginal delivery become possible. Where the patient is highly nervous and suffering, a few hours sleep under a full dose of morphin will often be followed by renewed uterine contractions, and engagement and descent. When pelvimetry shows that the pelvis is so small that engagement and

descent cannot be expected, it is, of course, useless to wait for these phenomena; but in cases of slight disproportion, where the patient has not received adequate care during the early part of labor, and if she is in fair condition, it may be possible to perform vaginal delivery after securing engagement and descent by the methods described.

In diagnosticating failure of engagement and descent through simple inertia, the operator must not neglect the possibility of

Fig. 51.—Flat pelvis. Ineffectual attempts at forceps delivery. Porro operation (Author's case).

rupture of the uterus. When this accident occurs, labor ceases suddenly with sharp pain, the uterus becomes very painful and tender upon pressure, fetal heart sounds cease, the patient is shocked, the pulse steadily rising. In simple inertia fetal heart sounds remain good, the patient is not shocked, labor does not cease suddenly, the uterus is not tender, but sometimes partially relaxed; the patient may be fretful and irritable, but does not show signs of a dangerous complication.

The Condition of the Lower Birth-canal as Indicating the Possibility of Vaginal Delivery.—One cannot determine the possibility and probable result of vaginal delivery without studying the size, development, and condition of the lower birth-canal. The head may engage and descend, but such difficulty may occur in its extraction from abnormality in the lower birth-canal that fetal death and injury to the mother may result. Williams,[1] in 1200 pelves,

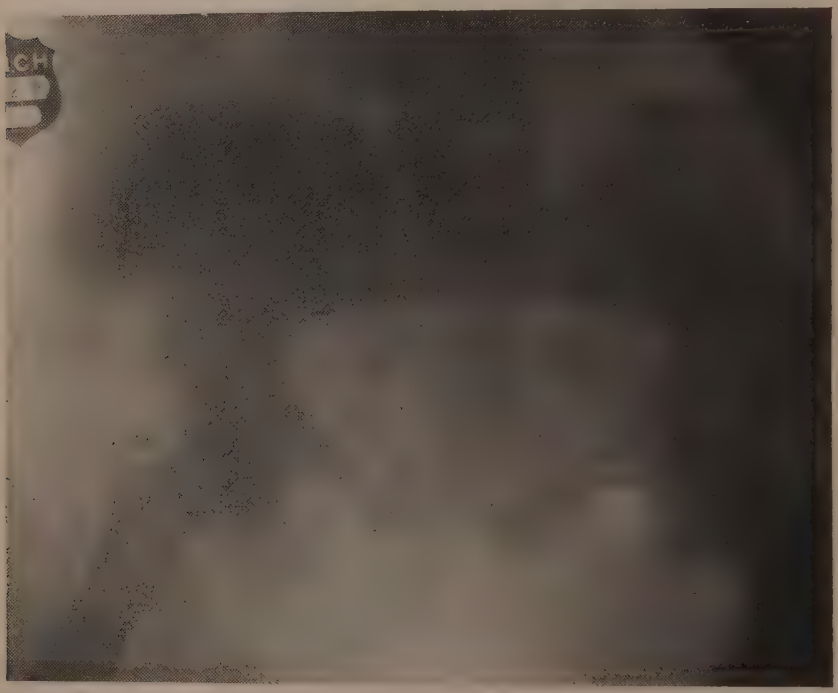

Fig. 52.—Justominor pelvis. Porro operation, after attempts at delivery by forceps (Author's case).

found 10.17 per cent. funnel pelves contracted at the outlet. In these cases the transverse diameter at the outlet was reduced to 8 cm., and the distance between the lower margin of the symphysis and the tip of the sacrum was less than 9 cm. Many of these cases were accompanied by sacrolumbar assimilation or the joining of the last lumbar vertebra with the sacrum. This deformity is much

[1] Surgery, Gynecology, and Obstetrics, June, 1909.

more common in negro than in white women. In many cases a double sacral promontory was present. In attempting to determine the possibility of spontaneous labor it has been observed that when the transverse diameter of the pelvic outlet measures 8 cm., spontaneous labor cannot be expected unless the distance from the inferior border of the pubes to the tip of the sacrum is greater than its average normal length, 7.5 cm. If this compensation is not

Fig. 53.—Irregularly contracted pelvis. Successful delivery by celiohysterotomy (Author's case).

established, spontaneous birth is unlikely and delivery by forceps may be difficult and attended with dangerous birth pressure.

Although the existence of deformity in the pelvic outlet has long been recognized, its practical importance has not received due consideration. The maternal morbidity in these cases is high from extensive lacerations, which may be so severe as to induce

a fatal termination. The maternal mortality is variously estimated, but is at least considerable, Walther concluding that 13.6 per cent. of the mothers die and 25.7 per cent. of the children. In Williams' 122 cases with outlet contraction, 103 were delivered at or near full term without a maternal death, and with the loss of 7 children. In these cases the deformity was recognized early and appropriate treatment applied as soon as needed. Thus, pubiot-

Fig. 54.—Rachitic pelvis. Celiohysterotomy (Author's case).

omy was done three times in the series, forceps applied ten times, and craniotomy performed once.

It is evident that in these cases we lack the clinical test afforded early in labor by the engagement and partial descent of the head into the pelvic brim. Should the head become impacted low in the pelvis, delivery by abdominal section might be difficult or impossible without fatal injury to the fetal skull in removing it from the pelvic cavity. In view of the dangers occasioned by contraction at the pelvic outlet, its measurement should be a part of pelvimetry applied to all patients. Should the transverse diameter of the

outlet be considerably less than 8.5 cm., without compensating increase in the anteroposterior diameter above 7.5 cm., elective Cesarean section should be chosen. If, however, the transverse diameter be 8.5 cm. and the anteroposterior diameter 7.5 cm. or above, the descent of the child into the pelvis may be encouraged, and when the head reaches the pelvic floor, rotates, and appears at the vulva, should delay occur, a cautious application of the forceps may be made. If delivery is not then effected, pubiotomy should be performed. If this is impossible, craniotomy is indicated in the interests of the mother.

Deficient development in the vagina and pelvic floor, malformation and cicatricial contraction, and previous laceration or injury may make vaginal delivery dangerous to mother and child. If the conditions are not extreme, and the other factors in labor are normally present, the presenting part may be allowed to come upon the pelvic floor, and incision made, if necessary, to permit its delivery. If the contraction of the soft parts is extreme, elective Cesarean section will be safest for mother and child.

Bibliography of Vaginal Delivery: Conditions Favorable For Abdominal and Intrapelvic Methods of Delivery, Discussion on: American Gynecological Society, American Journal of Obstetrics, July, 1908.

Andrews and Maxwell: Journal of Obstetrics and Gynecology of the British Empire, April, 1908.

Bayer: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 24, Heft 1, 1906.

Bumm and Blumreich: Atlas, Frozen Section, Wiesbaden, Bergmann, 1907.

Fruhimsholz: Zentralblatt f. Gynäkologie, No. 31, p. 974, 1907.

Fry: American Journal of the Medical Sciences, May, 1908.

Gaussel-Ziegelmann: L'Obstétrique, March, 1907.

Hermann: British Medical Journal, June 16 and 30, 1906.

Hofmeier: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 59, Heft 2, 1907.

Holden: Surgery, Gynecology, and Obstetrics, May, 1907.

Holzapfel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 633, 1907.

Jones: Journal of Obstetrics and Gynecology of the British Empire, November, 1906.
Kocks: Zentralblatt f. Gynäkologie, No. 52, 1907.
Kriwski: Zentralblatt f. Gynäkologie, No. 47, p. 1494, 1907.
Krönig: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 23, Heft 3, 1906.
Labor, Discussion on: American Journal of Obstetrics, September, 1908.
Leo: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 58, Heft 1, 1906.
Martin: Archiv f. Gynäkologie, Band 76, Heft 1, 1905.
Mueller: Archiv f. Gynäkologie, Band 82, p. 410, 1907.
Norris: American Journal of Obstetrics, July, 1908.
Owen: British Medical Journal, March 10, 1906.
Pankow: Zentralblatt f. Gynäkologie, No. 29, 1909.
Reynolds: Transactions of the American Gynecological Society, 1907: American Journal of Obstetrics, August, 1908.
Schultze: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 571, 1907.
Schutz: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 5, 1907.
Sellheim: Zentralblatt f. Gynäkologie, p. 17, 1907.
Sitzenfrey: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 56, Heft 3, 1905.
Stumpf: Archiv f. Gynäkologie, Band 82, p. 215, 1907.
Triolet: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 54, Heft 3, 1905.
von Herff: Zentralblatt f. Gynäkologie, No. 48, p. 1514, 1907.
Winter: Deutsche med. Wochens., No. 13, p. 534, 1907.

MANUAL EXTRACTION OF THE FETUS THROUGH THE VAGINA

Manual Extraction of the Head.—One of the earliest attempts at obstetric operations was the effort to extract the head with the hands from the vagina. It is probable that the shape of the hand, with its partially flexed fingers, suggested the shape of a forceps blade. When the head is upon the pelvic floor and delay occurs, it may be necessary for the operator to secure its expulsion by making traction upon the head with the hand; often the pelvic floor and perineum can be brought backward over the mouth and chin, and thus, by movement of extension, one extremity of the occipitomental diameter of the head can be delivered. The occipital end

of this diameter is usually born without difficulty. If it is necessary to make traction upon the head with the hands, the fingers

Fig. 55.—The prevention of perineal laceration. The accoucher is controlling the passage of the head through the vulvar orifice (Kerr).

of one hand may be placed over the occiput, the fingers of the other beneath the chin, and gentle traction may be made, while the head

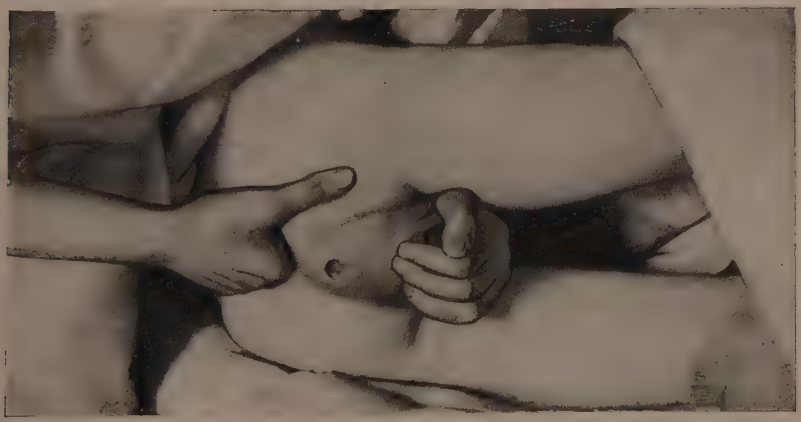

Fig. 56.—The prevention of perineal laceration. The accoucher, while maintaining the head in a condition of flexion, is now allowing it to escape from the vulvar orifice during the intervals between the pains (Kerr).

is in midposition, neither flexed nor extended. In delivering the head manually care must be taken not to turn the head through

too great an extent. Beyond ninety degrees, or the quadrant of a circle, the turning of the head is dangerous to the fetus.

In difficult deliveries with face presentation, where the head is low down and the circumstances are unfavorable for the use of the forceps, the obstetrician may succeed by getting his finger in the child's mouth, and rotating and delivering the chin, and thus securing subsequent expulsion of the head. To avoid severe injury to the child the fingers in the mouth should not exert strong or

Fig. 57.—Spontaneous birth, face presentation (Bumm).

sudden pressure, as it is possible to separate the lower jaw at its symphysis by so doing.

Manual Extraction of the Shoulders.—After the birth of the head, delay of varying length in the expulsion of the shoulders is not uncommon. This is rarely dangerous, but circumstances may arise which make it desirable to deliver the mother as soon as possible.

To rotate the shoulders quickly the patient should be placed

upon the edge of a bed or table, so that the operator can depress his elbow and introduce his fingers as high as possible. If she is restless and struggles, she should be at least partially anesthetized. The effort should first be made to reach the lower shoulder by passing the fingers of the hand corresponding to that side of the mother's body to which the back is directed along the pelvic floor and up

Fig. 58.—Delivering the posterior shoulder (Bumm).

into the pelvis as high as possible, at the side of the promontory of the sacrum. If the fingers be then bent forward toward the pubes, one or two can usually be introduced into the axilla, when traction downward will deliver the posterior shoulder. A similar maneuver upon the opposite side will usually be successful.

Where the shoulders cannot be rotated from below, very gentle traction may be made upon the head, grasping the occiput and chin

and avoiding flexing or extending the head. Such traction should be downward and backward in the axis of the pelvic brim. This may be reinforced to advantage by causing the uterus to contract through massage, and by pressing downward and backward behind the symphysis pubis, the urinary bladder being first emptied by catheter.

Fig. 59.—Delivering the posterior shoulder in vertex presentation, the mother lying upon her back (Nagel).

In extreme cases, where fetal death has occurred when the shoulders are impacted, cleidotomy may be necessary. This consists in severing the clavicle, one or both, with blunt-pointed scissors. The effect of this is to cause the shoulder to collapse and reduce the bisacromial diameter, very greatly lessening the size of the fetal trunk and permitting its descent and extraction. In the dead fetus the insertion of Brown's decapitation hook into the axilla will greatly facilitate the delivery of the child.

The Delivery of the Presenting Arm.—When an arm prolapses the first impulse of a midwife or friend of the patient is to pull upon the arm in the effort to extract the child. This will cause

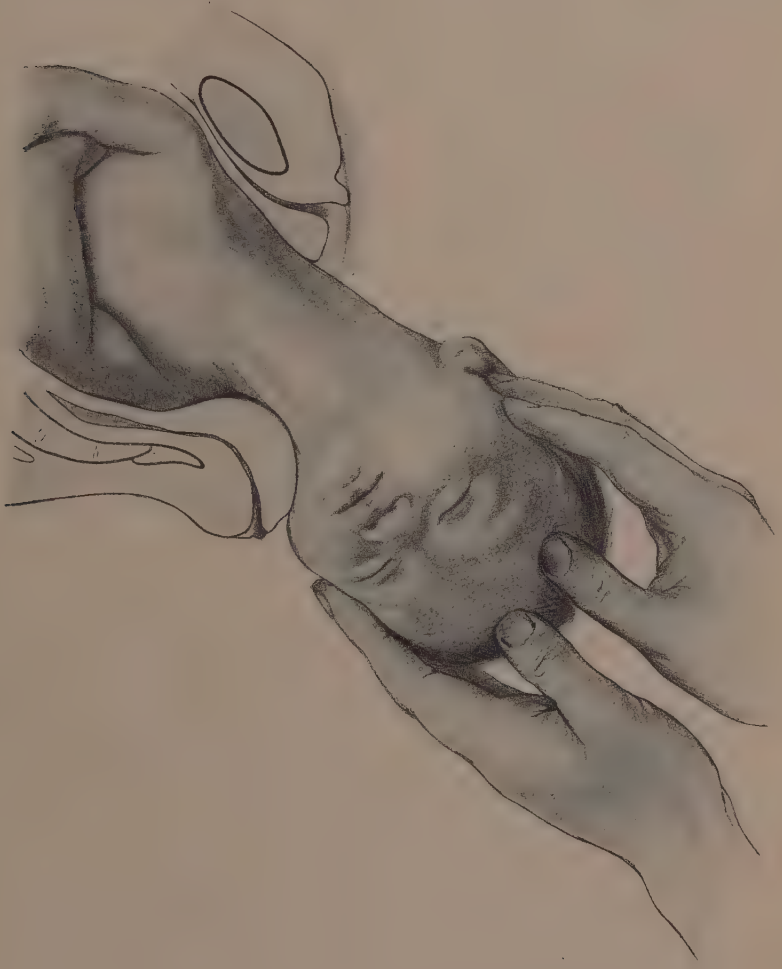

Fig. 60.—Impaction of anterior shoulder behind the pubes (Bumm).

fracture of the humerus or clavicle, and if the effort excites uterine contractions the shoulder will be wedged firmly into the pelvic brim. If the shoulder has descended sufficiently far and allowed the arm to prolapse, version or embryotomy is necessary. Only in

the case of an abnormally small fetus, or of a dead and macerated fetus, could traction upon the arm secure delivery.

Fig. 61.—Spontaneous birth: the head having been expelled, the upper shoulder is brought beneath the pubis (Nagel).

The Manual Delivery of the Child Presenting by the Lower Extremities and Breech (Breech Extraction).—In breech extraction, where delay occurs in delivery, the obstetrician will naturally attempt to bring down the hips by traction with the fingers. Although

the breech may be apparently inaccessible, he must not despair until a thorough effort has been made, under ether, to introduce the fingers into the child's groin. By etherization uterine contractions are often excited, and this, with the relaxation of the pelvic floor which accompanies etherization, will often bring the hips down so that the groins will be accessible. When the patient is anesthetized, with her hips upon the edge of a high bed or table, the opera-

Fig. 62.—Child in breech presentation with the lower extremities extended.

tor should pass two fingers along the posterior wall of the vagina upward into the pelvis, along the side of the promontory of the sacrum, and endeavor to hook the fingers into the groin of the fetus. Operators sometimes prefer to pass the fingers up the side of the pelvis and introduce them above the femur, carrying them toward the trunk of the child's body into the groin. Care must be taken that the fingers get completely to the groin, and that pressure is not made upon the middle of the femur. Should such occur, frac-

ture of the femur may be the result. Traction by the fingers in the groin may be supplemented by uterine contractions excited through massage and by suprapubic pressure downward and backward, when the posterior hip is thus delivered; the anterior will usually follow without much difficulty by the same procedure.

Fig. 63.—Breech presentation: grasping and bringing down the breech of the child, the lower limbs extended and the back posterior; first position (Farabeuf and Varnier).

Should the fingers fail to reach the child's groin after a patient and thorough effort, and delivery be imperative, the breech may be brought down by the blunt hook. This should be passed along the posterior portion of the pelvic cavity, along the abdomen of the child, and the point slipped over the brim of the pelvis into the child's groin. The delay in these cases usually makes the child's life a doubtful one, and in the interests of the mother delivery should

be effected, even with some injury to the child. In dead and macerated children the point of the blunt hook may be carried into the abdominal wall, or over the brim of the pelvis into the muscles about the ilium. If the child is in fair condition, care must be taken to

Fig. 64.—Breech presentation: first position; extraction of the breech by traction upon the groins (Nagel).

introduce the hook into the groin only, or upon the crest of the ilium, making as gentle traction as possible. Traction should then be made downward and backward until the hips descend to the pelvic floor, when the posterior hip should be delivered first by traction upward and forward.

Fig. 65.—Bringing down the body of the child. Breech presentation: second position (Farabeuf and Varnier).

Fig. 66.—Bringing down the body of the child by traction upon the groin; breech presentation (Farabeuf and Varnier).

Fig. 67.—Traction in both groins (Farabeuf and Varnier).

Fig. 68.—Breech presentation. Delivery of the child by traction in the groins (Farabeuf and Varnier).

The application of the forceps to the undescended breech is described under the head of Forceps Delivery, p. 163.

In cases where one leg prolapses and delay occurs in the descent

of the breech, an effort should be make to hook the fingers into the groin on the side of the retained leg, and this, combined with traction upon the prolapsed limb, should bring down the breech. Should the groin be inaccessible, the body can be brought down by gentle traction upon the prolapsed thigh, supplemented by uterine contrac-

Fig. 69.—Breech presentation, with the lower limbs, one flexed and one extended. Delivering the posterior hip by traction upon the crest of the fetal ilium (Nagel).

tions and suprapubic pressure. As soon as the groin is accessible, the breech and limbs should be delivered. In severe cases of fetal impaction, where the child is dead, the blunt hook may be used, together with traction upon the prolapsed extremity.

The Delivery of the Trunk and Upper Extremities.—During the

Fig. 70.—Delivery in breech presentation: bringing down the child by traction from the thighs (Farabeuf and Varnier).

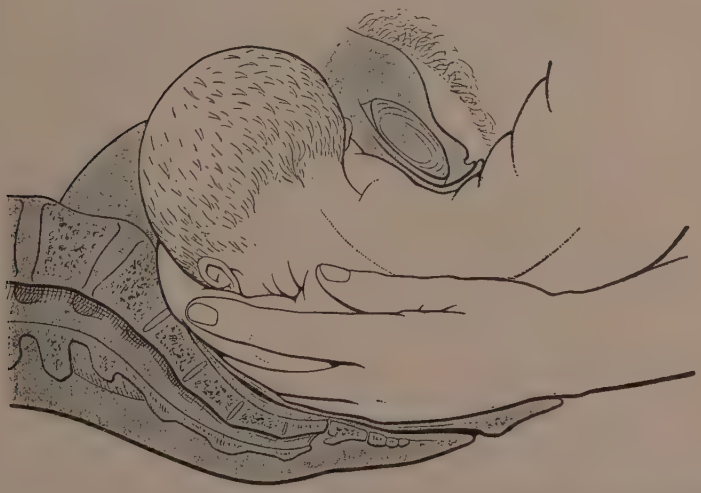

Fig. 71.—Breech presentation: bringing down the arm (Farabeuf and Varnier).

delivery of the lower extremities and breech the operator should take the opportunity to secure anterior rotation of the child's back.

Under anesthesia this can be accomplished and is of great value in securing a favorable delivery of the after-coming head. When the operator can grasp the lower limbs, the patient being anesthetized, he can rotate the back of the child anteriorly by gradual manipulation. The back need not point directly to the pubes, but obliquely forward and slightly outward.

Fig. 72.—Breech extraction. Rotating the breech to bring the back anteriorly by traction upon the thigh and leg.

In delivering the trunk and upper extremities, as well as the lower extremities, the parts of the child external to the mother should be wrapped in a warm sterile towel. This has a two-fold advantage—avoiding intra-uterine respiratory effort and giving the operator a much better grasp upon the fetus.

In order to successfully deliver the body, upper extremities, and head the patient must be on her back completely upon the edge of a high bed or suitable table. The thighs should, if possible, be held

by assistants, as it may be necessary to change the position of the thighs when the head reaches the pelvic floor. The patient should be under ether, administered by a competent obstetrician, as aid will be needed in manipulating the uterus and in making downward and backward pressure during the delivery of the head. The operator should have at hand the obstetric forceps with axis traction, gauze

Fig. 73.—Breech extraction. Rotating the back anteriorly by traction upon the thighs.

for intra-uterine packing, catheters for draining the bladder, materials for closing lacerations, and appropriate stimulants. The fetal body should be brought as far down as possible without traction by uterine contractions excited by massage and by pressure. The fetal body should be allowed to hang, moving freely, so that its weight may assist in descent. When the child is born up to the shoulders, if the back be directed toward the mother's left thigh, the operator

should grasp the lower extremities of the child, wrapped in a warm towel, in his left hand, and the fingers of the right hand should be placed upon the shoulders of the child. The child's body should be drawn strongly but gently downward and backward, rotating the body obliquely in the pelvic brim. It should then be raised strongly upward and obliquely outward, when the posterior shoulder will

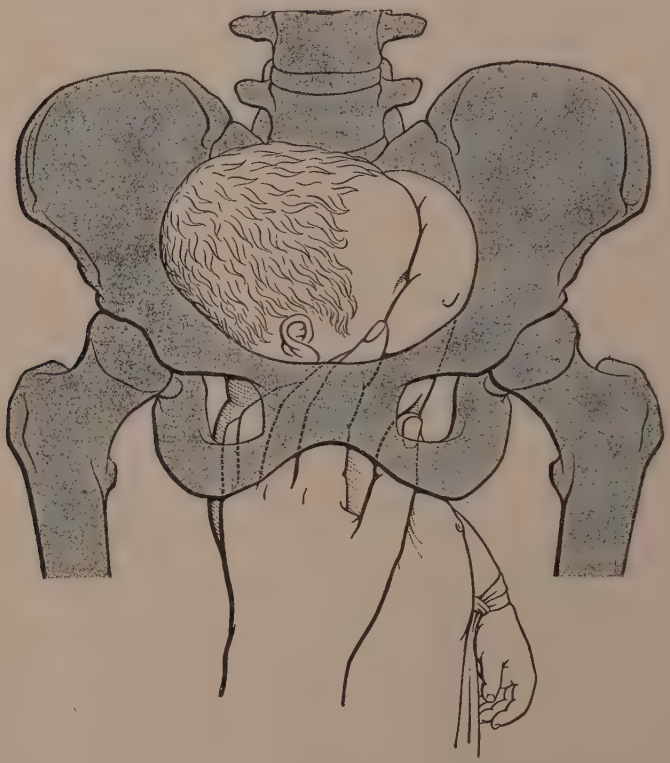

Fig. 74.—Bringing down the arm extended over the face (Farabeuf and Varnier).

frequently descend upon the pelvic floor. If it does not do so, the obstetrician should pass his right hand over the child's back and right shoulder, bringing the fingers down upon the anterior surface of the right humerus to the elbow. Gentle pressure should then be made in the bend of the elbow, and the elbow carried gently across the anterior surface of the child's body. With this motion the child's arm may be brought down and delivered at the vulva. Care

should be taken not to make pressure upon the shaft of the humerus, as fracture will almost certainly result.

When the lower shoulder has been delivered, the lower extremities of the child, wrapped in a warm sterile towel, should be firmly

Fig. 75.—Breech presentation: second position; the arms extended above the head; bringing down the arms (Nagel).

grasped and the body carried obliquely upward and outward to the opposite side. If the fingers be then passed over the back and along the humerus to the elbow, and gentle pressure made in the

bend of the elbow, the arm can be swept across the child's chest and delivered. These manipulations, to be successful, require strength and patience, and familiarity with the mechanism of labor and the contour of the pelvic cavity. Anesthesia is absolutely requisite for such successful manipulation.

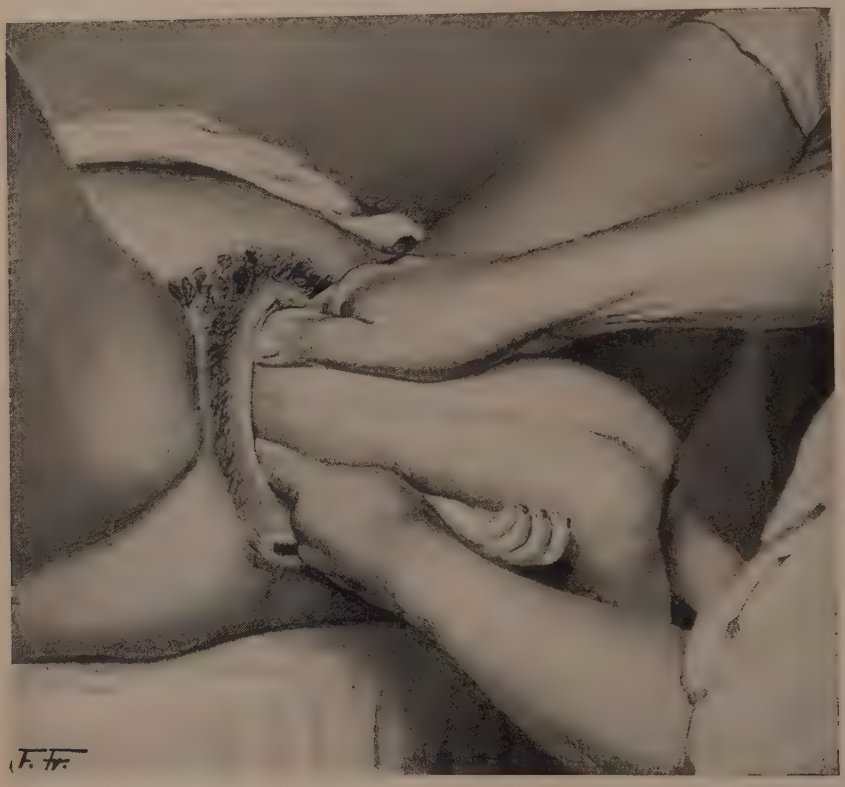

Fig. 76.—Breech presentation: second position; the posterior arm delivered; rotating the child's body in the direction of the arrow to bring the other arm into the hollow of the sacrum for delivery (Nagel).

In difficult cases with fetal impaction the effort to reach the extended arm with the fingers may fail. In such cases the integrity of the arm and shoulder must be sacrificed in the interests of the mother. The arm may be brought down with a blunt hook or, if the fetus be dead, the decapitation hook fixed above the clavicle and traction made upon the clavicle, fracturing it, or the hook

may become buried in the tissues, and shoulder and arm may thus be brought down. In transverse position with impacted shoulder, with wedge formation of the fetus, it is often necessary to amputate the upper extremity and perform cleidotomy to decompose the wedge. The fetal shoulders and head are then shoved upward and the lower limbs brought down and delivery terminated.

The Delivery of the After-coming Head.—The success of this maneuver depends upon the absence of great disproportion between

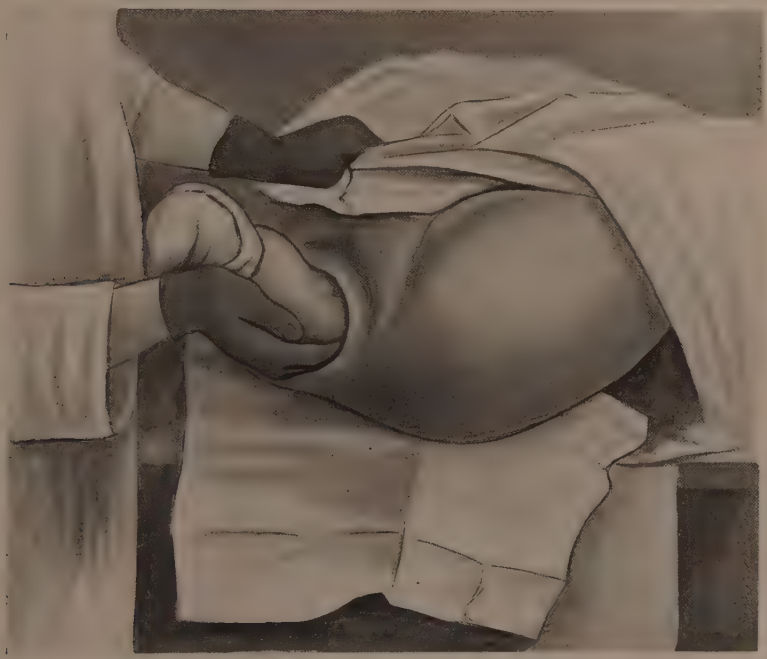

Fig. 77.—Breech extraction. Raising the body of the fetus wrapped in a towel, while the operator, with the other hand, makes pressure behind the pubis.

mother and child, the posture of the patient, intelligent assistance and anesthesia, and prompt manipulation on the part of the operator without undue haste. The patient should be upon her back at the edge of a high bed or table, her thighs flexed by assistants and rotated outward. As the body of the child emerges it should be wrapped in a warm sterile towel and the thighs grasped by the hand of the operator. As the head enters the pelvic brim, the

Daniel Walden, M.D.
336 Centre Street
Jamaica Plain, Mass.

operator should lay his free hand across the body of the mother, just above the symphysis pubis. The child's body should then be raised and brought upward and backward over the abdomen of the mother; simultaneously pressure should be made downward and backward behind the pubes. In the majority of cases this manipulation will cause the prompt birth of the head.

Fig. 78.—Breech extraction: making traction upon the breech.

To be successful, the patient must not resist, struggle, or draw backward. It is rarely possible to control a patient without anesthesia, and, hence, ether should be given in these cases. Anesthesia should not be very deep, but sufficiently so to make the patient perfectly manageable. Although the operator is tempted to act as rapidly as possible, he should remember that observation has shown that from three to five minutes may be spent in the extraction of

the after-coming head without injury to mother or child. The rapid delivery of the after-coming head may cause severe lacerations, and also imperil the child's life. The operator then should move promptly, but without undue haste.

Should this manipulation fail, the child should be placed astride the arm of the operator, and the long finger of the operator's hand, thumb upward, should be inserted in the child's mouth; some prefer

Fig. 79.—Breech extraction. The child astride the left arm of the operator, the right hand being placed upon the shoulders, while an assistant makes pressure above the pubes.

to insert two fingers. The remaining fingers of this hand should be bent over the child's shoulders to give a firmer grasp upon the body. With these fingers the child's head is brought downward and backward, flexion being maintained by the fingers in the mouth. The other hand of the operator should be placed behind the pubes, pressure being made downward and backward in the axis of the pelvis. By raising the child's body with the arm which supports it, and by

the downward and backward pressure of the external hand, the child's head is brought over the pelvic floor. To be successful this

Fig. 80.—The delivery of the after-coming head with the occiput posterior, Prague method (Kerr).

manipulation requires absolute control of the patient, moderate surgical anesthesia, the patient in favorable position, the urinary bladder being completely emptied by catheter, and familiarity with the anatomy of the pelvic cavity and with manipulation of the fetal head. After the head passes through the pelvic brim and comes

upon the pelvic floor, the thighs of the patient may be allowed to descend, although they should be carried asunder. This maneuver facilitates the extraction of the head.

Fig. 81.—The operator delivering the after-coming head by traction in the mouth and suprapubic pressure combined (Nagel).

Should the delivery of the head fail by manual efforts, the use of the forceps is indicated. The instrument should be placed upon the sides of the child's head, a firm but gentle grasp ob-

Fig. 82.—Breech presentation: delivering the after-coming head. The right hand of the operator is placed over the child's shoulders; the long finger of the left hand, palm uppermost, is placed in the child's mouth. The child is astride the operator's left arm, and pressure is made by an assistant upon the retained head through the abdominal and uterine wall (Nagel).

tained, and axis-traction be practised downward and backward until the pelvic floor has been reached. A forceps of considerable

Fig. 83.—The final delivery of the after-coming head in breech presentation (Nagel).

length is necessary for this manipulation, and Simpson's, with axis-traction, or Tarnier's will be found useful. When the head reaches

the pelvic floor it may be delivered in the usual manner. During the application of the forceps the body of the child must be raised out of the way of the operator by an assistant, and this manipulation will assure the descent of the head and facilitate the application of the forceps.

Fig 84.—The delivery of the after-coming head by forceps (Kerr).

Should the head become extended, the back of the child rotating anteriorly, under complete anesthesia, the operator should endeavor to introduce the fingers into the mouth and draw down the chin. If this can be done, he may proceed to deliver the child in the usual manner, with the fingers in the mouth. Should the chin

Fig. 85.—The after-coming head in flexion (Nagel).

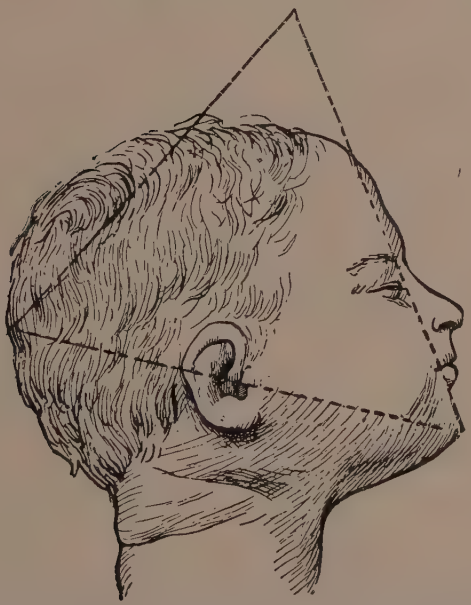

Fig. 86.—The after-coming head in partial extension (Nagel).

become impacted, the life of the child will be lost, and craniotomy upon the after-coming head will be the operation of choice.

In cases where the obstetrician has charge of the patient from the beginning of labor he can secure anterior rotation of the body by manipulating the lower extremities and the breech. In neglected cases he may not be called to the patient until the body of the child has been born, the shoulders and head remaining within the uterus. He may then find the back posterior, the thorax anterior, and the chin above the pelvic brim with strong extension. The child is, in the great majority of cases, dead when the physician sees the patient.

Fig. 87.—The bimanual delivery of the after-coming head. Flexion maintained by introducing the fingers into the child's mouth (Farabeuf and Varnier).

In these cases nothing can be done without complete anesthesia. Unless the facilities for operation are good, such a case must be transferred to a maternity hospital. After proper preparation under complete anesthesia, the patient may be turned upon her side, the upper thigh raised, and the body of the child drawn backward over the anus of the mother. The operator should then introduce as much of the hand as possible, endeavoring to reach the chin. This should be brought down, if possible, in the oblique

diameter of the pelvic cavity, and the head extracted. Should manual extraction fail after the chin has descended, the forceps may be tried. Gentle traction only should be made, and if this fails, craniotomy upon the after-coming head is required.

Complications of Breech Extraction.—Extraction by the breech is especially dangerous for the infant. The exposure of its body to a lower temperature favors intra-uterine respiration, and inspiration

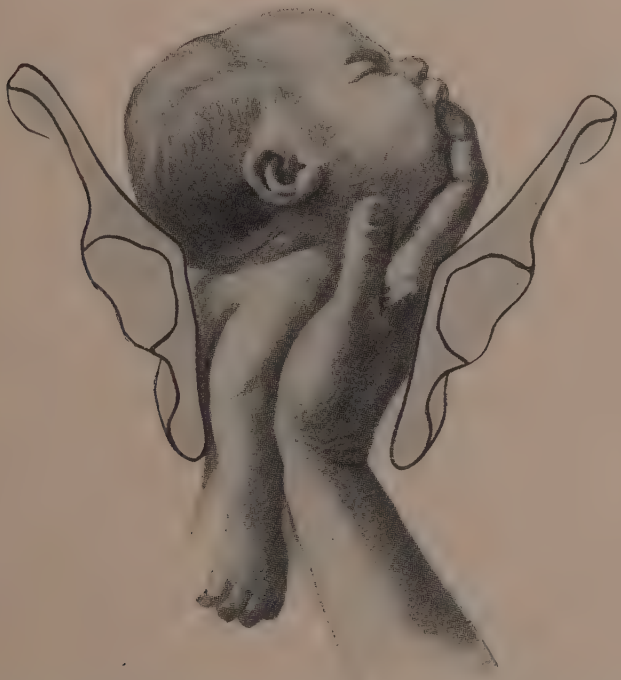

Fig. 88.—Dislodgment of the chin in the after-coming head (Bumm).

pneumonia may result. Pressure upon the trachea may have a like effect. Pressure upon the cranium during rapid forcible extraction through the bony pelvis may fracture its bones and produce cerebral hemorrhage. The fetal mortality of breech extraction is variously estimated at from 10 to 30 per cent. To succeed in this maneuver the operator must constantly keep in mind the anatomy of the pelvic cavity and of the fetal head. In bringing the head through the

pelvis the bitemporal diameter will fit most safely in the antero-posterior diameter of the pelvic brim. The occiput can best be accommodated at one side of the promontory of the sacrum, the face and chin at the anterior extremity of the oblique diameter. While passing the promontory the head may be practically transverse in the pelvis, but as soon as possible it should assume an oblique position and thus descend to the pelvic floor. If the head passes in the axis of the pelvis undue obliquity will not develop, otherwise the presentation of a parietal bone may occur with impaction, followed by fetal death. Should extension become extreme, the chin may become impacted, with a like result. Fracture of the skull usually occurs while the head is passing the brim of the pelvis. Dangerous pressure, causing respiratory complications, takes place while the child's head is upon the pelvic floor and outlet of the vagina. In cases where disproportion is present, Walcher's position, at the moment when the head is passing the brim of the pelvis, may be of great value. While strong traction may be necessary, it should be exercised as gradually as possible and deliberately. The same caution is necessary in the delivery of the child over the pelvic floor. Rapid breech extraction causes severe lacerations in primiparous patients, which may be followed by alarming hemorrhage. In difficult cases episiotomy may be demanded. Prolapse of the cord is a further complication of breech extraction, and in manipulating the child the cord should be kept at the side of the promontory, if possible, where it will escape dangerous pressure. Should the cord become pinched between the child and the pelvis, the body of the child should be rotated slightly in the effort to relax the pressure. Should this fail, delivery must be expedited as greatly as is safe. Fractures of the humerus, clavicle, and skull, subluxations of the shoulder, elbow, and cervical vertebræ in the fetus may occur during breech extraction. Before operating the obstetrician should inform the husband of the patient, or her nearest responsible relatives present, that the condition is an abnormal one and that danger to the fetus is inevitable. Appliances for resuscitating the

child, for producing artificial respiration, for the application of heat, and skilful care, should be at hand.

Breech Extraction With Premature Fetus.—In hemorrhage, toxemia, and other conditions threatening the mother's life, pregnancy may be terminated in her interests. The fetus is often dead in these cases, and its small size and the partial dilation of the uterus may make its extraction difficult. The head may be severed from the body and retained within the womb. In operating upon these cases sufficient dilation, if possible, must be secured. As the child is premature or dead, haste in its interest is not necessary, and the operator should use the body of the fetus as a dilator. If the head be separated and retained, it may be extracted with strong serrated forceps, with placental forceps, or the uterus may be packed with gauze and no further effort made at extraction. Within forty-eight hours the uterus will expel the greater part of the gauze and the retained head.

Breech extraction should not be undertaken unless the operator is prepared to immediately close lacerations and control hemorrhage. While the operation is often thrust upon the general practitioner in private houses, he is placed at great disadvantage, for its proper performance requires a good table or high bed, a competent anesthetizer, and skilled assistants. Breech cases require the services of several physicians, and should, if possible, be conducted in a hospital.

Breech delivery may be indicated after vaginal Cesarean section, after pubiotomy, and after suprasymphyseal extraperitoneal section. In these cases, while the operator naturally desires to save the child, he must remember that the mother is in especial danger. After vaginal Cesarean section and suprasymphyseal section the head must be brought through the lower uterine segment. In breech extraction this tissue could readily be torn and serious consequences follow. After pubiotomy, when the child is extracted by the breech, the head may bring the vaginal tissues against the severed ends of the pubic bones, and severe lacerations opening into the pelvic and peritoneal cavities have resulted. Breech extraction

for these operations must be conducted with especial care to avoid lacerations.

In placenta prævia treated by combined version, with the bringing down of the breech, if the mother's interests are to be considered, the operator must avoid rapid extraction. The child's body is to be used simply as a plug, and remain upon the pelvic floor until the uterus contracts and expels it or forces it downward (Fig. 129, p. 216). As soon as the hips appear at the vulva, or as soon as both lower limbs have been brought down, so that the body is under control, efforts at extraction should cease. When the uterus acts, the child should be delivered very slowly and the uterus followed down and massaged by an assistant. The birth of the child should be followed by measures to prevent relaxation and hemorrhage. Until the body of the fetus is partly delivered the uterine muscle should be kept in tonic condition by strychnin and ergot.

Bibliography of Breech Extraction

Cohen: Zentralblatt f. Gynäkologie, p. 196, 1907.
Cukor: Zentralblatt f. Gynäkologie, No. 19, 1908.
De Normandie: Surgery, Gynecology, and Obstetrics, April, 1908.
Eisenstein: Zentralblatt f. Gynäkologie, No. 3, 1909.
Fürst: Zentralblatt f. Gynäkologie, No. 32, p. 981, 1907.
Garipny: Zentralblatt f. Gynäkologie, No. 30, p. 942, 1907.
Groeschel: Zentralblatt f. Gynäkologie, No. 46, p. 1456, 1907.
Hammerschlag: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 245, 1907.
Hofbauer: Zentralblatt f. Gynäkologie, p. 354, 1907.
McKerron: Journal of Obstetrics and Gynecology of the British Empire, No. 4, 1907.
Müller: Zentralblatt f. Gynäkologie, No. 32, p. 979, 1907.
Nijhoff: Zentralblatt f. Gynäkologie, No. 25, 1907.
Reber: American Journal of Obstetrics, vol. 55, p. 89, 1907.
Rühl: Zentralblatt f. Gynäkologie, No. 31, p. 958, 1907.
Schulz: Inaug.-Diss., Breslau, 1905.
Veit: Zentralblatt f. Gynäkologie, No. 23, 1907.
Ziegelmann: L'Obstétrique, March, 1907.

DELIVERY BY FORCEPS

It seems more than probable that the shape of the hand suggested to Palfyn and Chamberlain the shape of the cephalic portion of the forceps. As any one attempting to extract the presenting part with the two hands would hold the arms parallel during the attempt, so the first obstetric forceps was not crossed, but two blades were held parallel and bound together with a leather thong. The danger of pressure upon the child's head must have been less in this way than when the blades were crossed, but the security in fastening was also less and the grasp upon the head not as secure.

The Forceps as An Instrument.—So many have been the modifications of the forceps by different operators that the attempt to describe them all would furnish an instrument-maker's catalogue of considerable size. We shall confine our attention to the forceps most in use.

In America and England the Simpson forceps is that commonly employed; in France, the Tarnier; in Germany and Austria, the Naegele. The Simpson is remarkable for its solid construction, the ease with which it locks, its ready application, and its great utility. Its blades, when closed, are further asunder than those of the Tarnier or Naegele forceps. They distend the mother's tissues more greatly and tend slightly to greater laceration. On the other hand, when closed the Simpson forceps exerts less pressure upon the head than do the other varieties. The length of the Simpson forceps, as ordinarily made, is such that it can usually be applied at the brim of the pelvis successfully.

The Tarnier forceps is remarkable for its length, close approximation of its blades, its narrowness with the blades closed, and its axis-traction attachment. It is especially useful in the high application of the forceps, with the presenting part engaged in the pelvic brim. Its narrower blades make it a good instrument for use in primiparæ. When accurately applied to the sides of the head and in skilful hands the Tarnier forceps gives excellent results. It may cause dangerous birth pressure if improperly applied, is not so easily

applied or locked as the Simpson forceps, and is not applicable in so large a number of cases.

The Naegele forceps has blades narrower than the Simpson, locks with a button and a notch, and is of average length. It has no axis-traction device. It should be applied to the side of the head and can exercise very strong pressure upon the fetal cranium.

The Solid-bladed Forceps. Many of the earlier forceps had solid blades, and such an instrument is occasionally used at present. Its blades are long and narrow, the pelvic curve of the average, and the advantage of the instrument lies in the fact that with it the fetal head may be rotated without the danger of including maternal tissue in the grasp of the forceps. Its utility is limited and it is not in extensive use.

Good and Bad Forceps. Good forceps are made of thoroughly tempered steel, sufficiently heavy to be strong, have proper curvature, are well plated, and smoothly finished. The various parts of the instrument fit properly and the instrument is of requisite length. Bad forceps are made of imperfect steel, are light in weight, badly finished, with inferior appliances. While one cannot test forceps before purchasing, so many instruments are sold that it is well to examine critically before buying.

Essential Portions. The cephalic portion of the forceps, fitting upon the head, should be of sufficient size, when applied over the parietal bones, to have the parietal protuberances lie in the middle of the fenestræ. The blade should extend to the posterior portion of the parietal bone, without projecting to any extent beyond. The fenestra should be sufficiently large to allow the ear of the average full-term child to pass through it or lie within it without dangerous pressure.

The lock of the forceps should be readily adjusted and secure. For practical purposes the Simpson lock, if properly used, is least apt to cause injurious birth pressure, and is most easily adjusted; it can readily be loosened by slight motion of the blades, allowing, if desired, a slightly different application. The most complete lock is that of

the Tarnier forceps, whose combined screw not only keeps the blades together, but is reinforced by a transverse screw, whose force is exerted toward the proximal extremity of the blades. The button and notch lock is easy to adjust, but less efficient than the others.

The handles of most forceps now made are of steel, nickel-plated; to reduce the weight of the instrument they are often hollow, and aluminum is sometimes combined with steel for lightness. The handles should be large enough to afford a firm grasp by a large-sized male hand. They may be corrugated and at the distal extremity have a shoulder projection, which in Hodge's forceps was turned into a blunt hook for extraction. If rubber is used upon the handles, it must be so well made that the forceps can be boiled repeatedly without injury to the rubber. Such can be made by good workmen. The forceps is said to have a cephalic and pelvic curve. The cephalic is that in the portion of the blades fitting over the head, and is intended to permit the firm and accurate grasp of the presenting part. The pelvic curve enables the operator to pass the instrument upward into the pelvic brim. The curves of good forceps differ very little, that of the Tarnier being adapted for high application.

Axis-traction.—As the name indicates, axis-traction consists in pulling in the axis of the pelvis. Although this phrase is commonly used, it is more accurate to say that axis-traction consists in pulling in the axis of the birth-canal. This differs from the pelvic axis in that the axis of the birth-canal extends downward and backward to the pelvic floor, and then upward and forward. The axis of the pelvis is a curved line which does not pass to the pelvic floor. In using the forceps the axis of the birth-canal is followed, for it is often necessary to bring the presenting part strongly down upon the pelvic floor, whose aid is desired in securing rotation. Delivery is then effected by traction upward and forward until the vertex passes beneath the pubes.

Axis-traction may be effected by an experienced operator with forceps having no appliances for axis-traction. This is accomplished

by placing one hand firmly across the forceps applied to the head at the lock, if possible, just in front of it. Pressure is then made downward and backward with this hand; when the pelvic floor is reached, the other hand grasps the distal extremity of the blades and pulls upward and forward. While this maneuver may answer in cases not difficult, in those requiring prolonged traction, with difficult descent of the fetus, this method is inefficient.

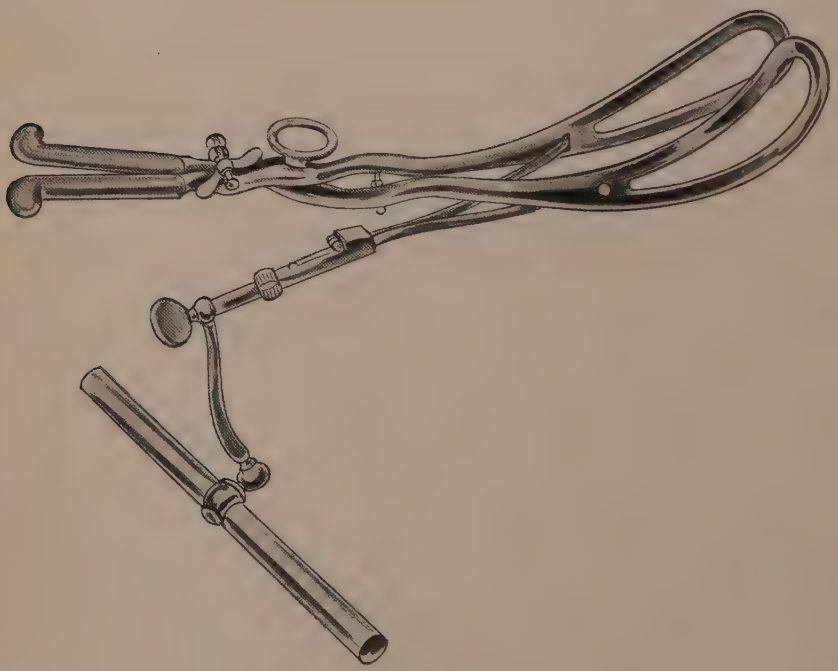

Fig. 89.—Tarnier's forceps.

Axis-traction may also be made in a simple and more or less efficient manner by passing a loop of stout cord about the forceps just in front of the lock. This cord is sufficiently long to reach nearly to the floor from the bed or table on which the patient lies. Placing one foot in this loop of cord the operator may make traction downward, while with the hands grasping the forceps handles he may direct traction and, when desired, pull upward and forward. Axis-traction may also be made by detachable hooks applied to the shanks

of the forceps between the lock and the handle or at the posterior extremity of each fenestra. This method has been extensively used and recommended by Reynolds and others.

But these substitutes for axis-traction appliances are unsatisfactory and should be employed only in the lack of something better. Tarnier's axis-traction appliance leaves nothing to be desired from the standpoint of mechanism; it is, however, at times not easy of application. It applies its traction at the sides of the blades near the posterior extremity of the cephalic portion. Reynold's hooks and Murray's detachable handles may be applied to the posterior extremity of the fenestrated portion of the blades. This point of

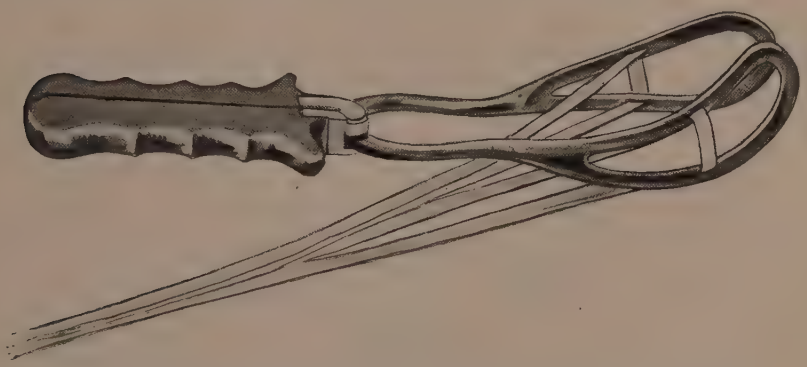

Fig. 90 —Simpson's forceps, tape attachment without traction bar.

application is practically that of the Tarnier. In other axis-traction forceps, axis-traction mechanism is applied to the handles, near or just anterior to the lock. The point of application of the axis-traction mechanism is important because it has to do with the securing of complete flexion of the head. Furthermore, if the force exerted upon the head can be applied opposite the parietal eminences at the middle of the head, more efficient traction will follow.

Poulet's Tapes.—Poulet applied to a long narrow-bladed forceps tapes passed through apertures in the cephalic portion of the blade at its middle. These tapes were then fastened on an axis-traction handle, by which force was exerted downward and backward. This handle was bent at its distal extremity at right angles with its first

portion, which was parallel with the pelvic floor during application. The advantage of the Poulet tapes lay in the fact that the traction was applied opposite the center of the fetal head, which was accomplished by no other instrument. The tapes occupied little room, were easily applied, could be easily sterilized, and destroyed after use. The disadvantage of the tapes lay in the fact that with strong traction they sometimes broke, and if carelessly used they cut the mucous membrane of the birth-canal. The writer has utilized them in connection with Simpson's forceps in a very satisfactory manner. The Simpson forceps is made a little heavier than the ordinary instrument, and apertures large enough to permit the application of tapes are placed at the middle of the cephalic portion of the blades. The best quality of linen tape is selected, and passed through these apertures from without inward. If desired, they may then be passed through the traction bar, as shown in the accompanying illustration. Practically it is seldom necessary to use the traction bar, for the operator can grasp the tapes in one hand, making traction downward and backward, and controlling the movements of the head with the handles of the forceps grasped in the other. A considerable experience by myself and others has shown the practical value

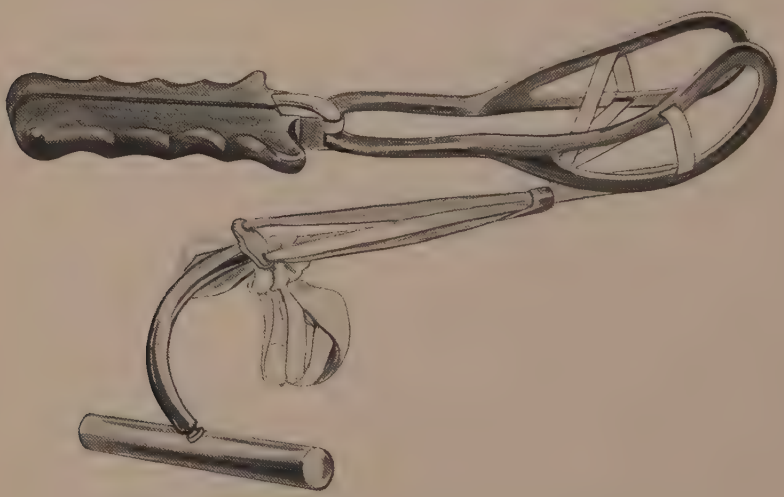

Fig. 91.—Simpson's forceps, tape attachment and traction bar.

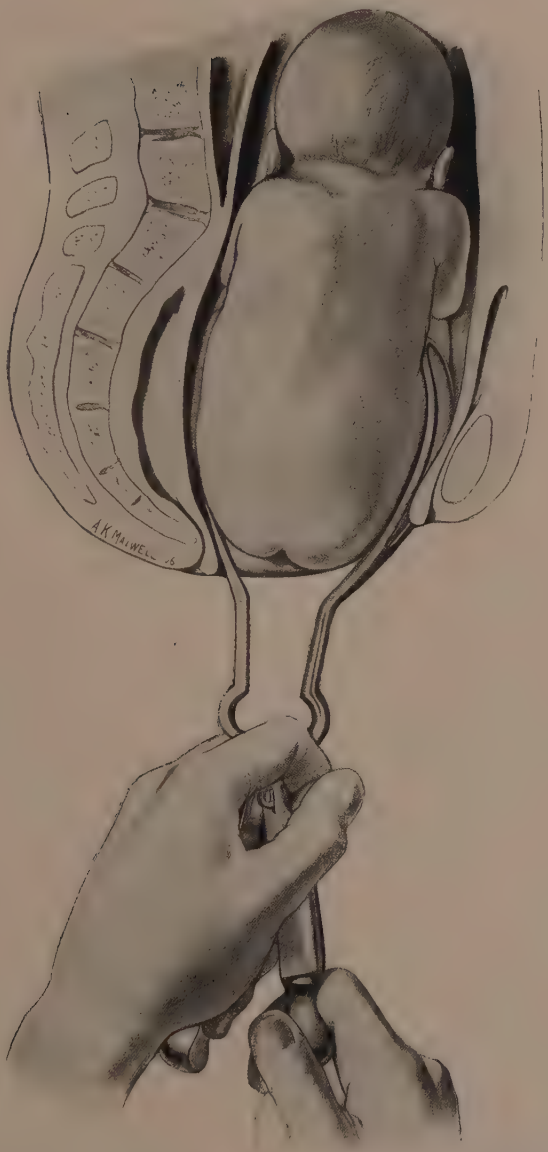

Fig. 92.—Impaction of the breech. Delivery by means of forceps (Kerr).

of this instrument. The breaking of the tapes is of very rare occurrence and does no harm. The point of application of the axis-traction produces excellent flexion of the head, and in posterior rotation

of the occiput, where anterior turning completely fails and the occiput must be delivered from behind, we have been able to deliver cases with this instrument where other forceps have failed. In posterior occiput, unless rotation can occur, very complete flexion is necessary.

Experience has caused me to believe that forceps should not be applied in any case without keeping in mind the necessity for axis-

Fig. 93.—Occipital presentation: the forceps placed upon the sides of the child's head (Farabeuf and Varnier).

traction. Even when the head is upon the pelvic floor it is often necessary to make several tractions downward and backward to complete rotation before bringing the occiput upward beneath the pubes. It is our rule always to use forceps with axis-traction appliances, and in the majority of cases the Simpson forceps, with tapes, proves most efficient. For prolonged and difficult traction at the brim of the pel-

vis, if the instrument could be put upon the sides of the head, the Tarnier forceps might be chosen.

The Application of the Forceps to the Presenting Part.—The forceps is used in the great majority of cases upon the fetal head. Where the breech does not descend, the Tarnier has been applied over the trochanters, fastened as securely as possible, and traction made in the axis of the pelvis (Fig. 92). There is danger of slipping, however, when the forceps is applied to the breech, and for this reason this maneuver is rarely practised.

Every effort should be made to place the forceps upon the sides of the fetal head over the parietal bones (Figs. 93 and 94). Mod-

Fig. 94.—Forceps applied to the sides of the fetal head (Kerr).

erate pressure in this position does no harm to the cranium or its contents, flexion or extension is secured most readily, and the application may be said to be a normal and rational one. The application of the forceps over the forehead and occiput should not be practised, injury is inevitable, compression of the head produces increase in the biparietal diameter, which in complicated cases must cause additional difficulty. It is, however, sometimes impossible to apply the forceps to the sides of the head accurately, then the instrument should be applied at the extremities of the oblique diameters at the pelvic brim, and traction thus made until the head is well in

the pelvic cavity and the blades can be rotated to the sides of the

Fig. 95.—Oblique grasp of the head by forceps, showing one blade over the face (Kerr).

Fig. 96.—Oblique grasp of the head by forceps, showing one blade over the occiput (Kerr).

cranium. In face presentation the blades would naturally lie along the sides of the face near the malar portions (Figs. 98 and 99). Pres-

Fig. 97.—One blade of the forceps over the face, the other over the occiput (Kerr).

Fig. 98.—Face presentation: the forceps applied to the sides of the head (Farabeuf and Varnier).

sure thus applied would cause little or no injury and extension would be favored by the application.

Dangerous Applications of the Forceps.—When the head is impacted transversely at the pelvic brim, with rotation downward of one parietal bone, the application of forceps is often undertaken, usually with disastrous results. It is difficult in these cases to get the instrument applied in such a manner that it will not slip, and traction wedges the head more firmly into its vicious position. In brow presentation, forceps application is similarly useless and in-

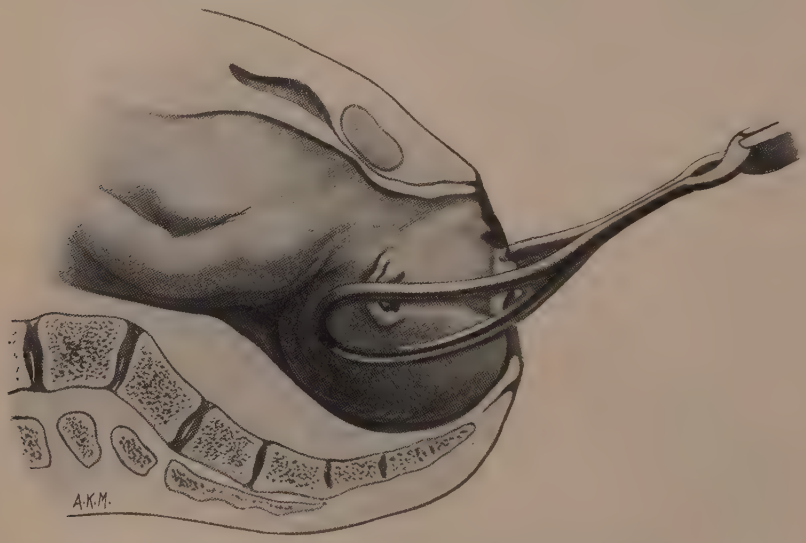

Fig. 99.—Forceps in face presentation (Kerr).

jurious. In face presentation, with posterior rotation of the chin, the use of the forceps is usually injurious; very rarely, if the head be small and not impacted, it may be dislodged by the forceps and ultimately brought under the pubes.

The Repeated Application of the Forceps.—Where labor stops early in the expulsive stage, the presenting part not rotating, it may be necessary to apply the forceps, bringing the head down upon the pelvic floor to secure rotation, then removing them, and re-applying them for final delivery. Although each manipulation is a disadvantage to mother and child, this practice in skilled hands produces

good results and can be employed when necessary. If axis-traction be employed, it is less often necessary than in its absence. Simpson's forceps is especially designed to permit essentially frequent

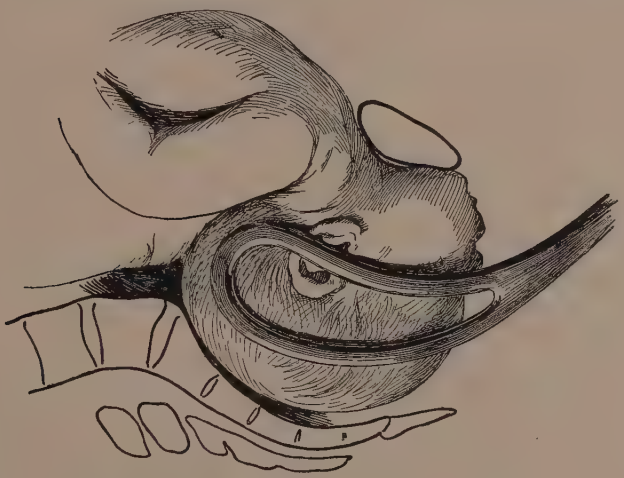

Fig. 100.—Forceps in face presentation (Bumm).

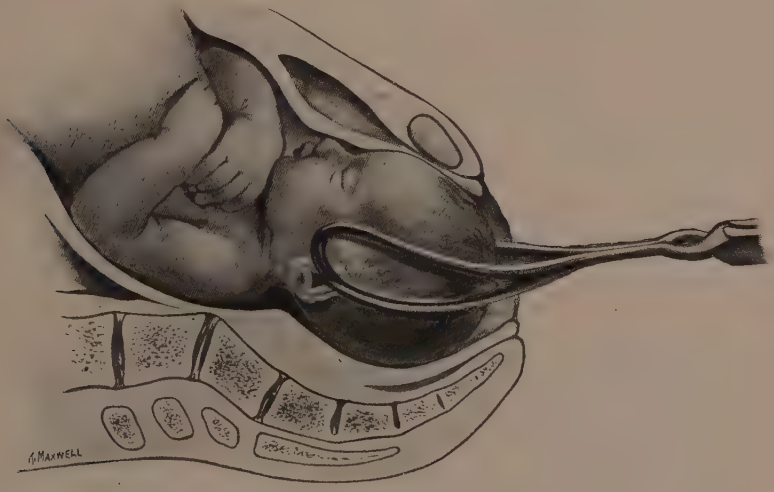

Fig. 101.—Forceps in persistent occipitoposterior position of vertex (Kerr).

application of the forceps without removing the instrument from the birth-canal.

In cases where rotation is absent and the operator finds great

difficulty in applying the forceps to the sides of the head, he may follow an old rule, and insert the instrument along the sides of the pelvic cavity. Usually the instrument is inserted in an anteropos-

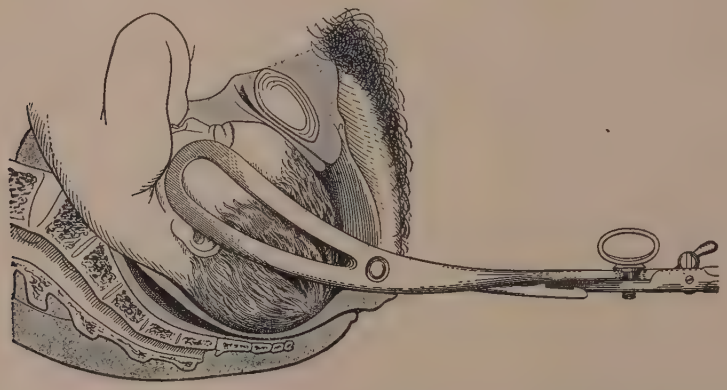

Fig. 102.—Delivery by forceps with the occiput posterior (Farabeuf and Varnier).

terior direction and not obliquely. The head is then grasped sufficiently firmly to prevent the forceps from slipping, and traction is made in the axis of the birth-canal; between each traction the blades

Fig. 103.—Delivery by forceps with the occiput posterior (Farabeuf and Varnier).

are separated, the grasp upon the head relaxed, and the head allowed to rotate within the forceps. Under this manipulation the head will gradually fit itself into the grasp of the forceps, and at the moment

of delivery the instrument will usually be found at the sides of the child's head.

Rotation With the Forceps.—With the instruments most commonly employed it is a dangerous procedure to grasp the head if the forceps be rotated in the grasp of the operator. The narrow solid-bladed forceps is, however, intended for this use. It is applied under complete anesthesia, the position of the child being first carefully mapped out by palpation and auscultation. The position of the back should be clearly kept in mind. The instrument is then applied to the sides of the head, and gentle and intermittent rotation of the head is made in such a position as to bring the occiput

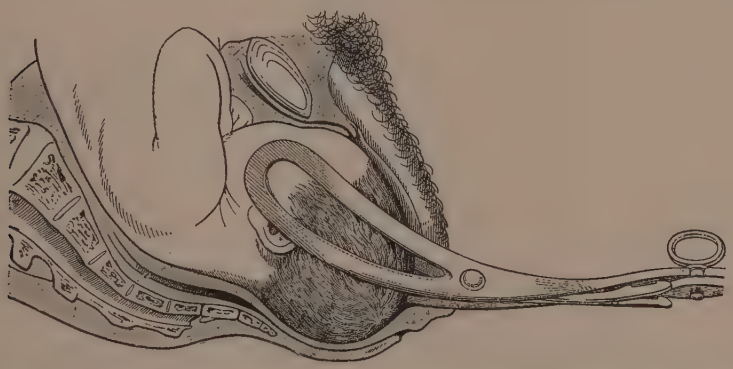

Fig. 104.—Delivery by forceps with the occiput posterior (Farabeuf and Varnier).

toward the side of the pelvis toward which the back is directed. When anterior rotation is sufficiently advanced to permit a further application of the forceps, the narrow-bladed forceps is removed, and may be, if desired, re-applied to the child's head. At the end of the first application with the narrow-bladed forceps the extremities of the cephalic portion of the blades would be directed backward, a position unfavorable for delivery over the pelvic floor. After rotation has been partially or completely accomplished, the instrument should be removed and again re-applied, and used in the ordinary manner to complete delivery. In skilful hands this procedure is attended with little danger and considerable success. With the ordinary forceps it is safer to make intermittent traction in the axis

of the birth-canal, relaxing the grasp of the instrument between contractions; or to bring the head strongly down upon the pelvic floor, removing the forceps, and allowing the patient, if possible, to bring about rotation by the action of the uterine and abdominal muscles.

In all cases where rotation is deficient, the effort should be made to secure sufficient anterior turning with the hand to enable the operator to make a satisfactory forceps application. Under surgical anesthesia with ether the operator should introduce the hand, accurately map out the position of the head, and grasp the head, endeavoring to rotate it so that the occiput turns toward that side toward which the back is directed. Should this manipulation excite pain, he should hold the head firmly and wait for the pain to subside. In almost all cases the head can be rotated sufficiently to allow the application of the forceps to the sides of the head. If the occiput can be carried in front of the median line of the pelvis and axis-traction made, anterior rotation will usually occur. Care must be taken that this manipulation is practised under complete anesthesia, as otherwise danger of uterine rupture might be present.

The Function of the Forceps.—The forceps is a tractor only; it is not to be used to compress the head, and under ordinary circumstances it is not a rotator. If it is desired to lessen the size of the cranium, this can be done more safely by craniotomy. If it is desired to rotate the head, this is best accomplished by the hand; should the hand not succeed, the solid-bladed forceps may be applied. The forceps supplements the expulsive action of the uterus and abdominal muscles. If these functions of the instrument be kept clearly in mind, it will not be employed to drag a fetus through a contracted pelvis, fracturing its bones and destroying its life; nor to forcibly rotate a large impacted head, nor, by leverage, to pry an impacted head loose from the mother's swollen tissues. Yet these injurious mistakes have been made in the application of the forceps.

The Indications for Forceps Delivery.—The forceps is the most

commonly used instrument of surgery, the most frequently abused, in safe hands the safest, and in incompetent hands the most dangerous and bloody. It is to be used to save the lives and health of mother and child.

On the side of the mother, its most common indication is the failure of her expulsive efforts from threatened exhaustion. Usually the mother's nervous energy fails because of the sufferings of labor, her inability to sleep, to bear pain, to take nourishment. In some cases the head is brought down upon the pelvic floor when the resistance of the pelvic floor, with the added suffering which pressure produces, causes labor to cease. The forceps is properly applied for conditions which require prompt delivery in the interests of the mother. Aside from threatened exhaustion or eclampsia, if conditions are favorable for vaginal delivery, signs of concealed hemorrhage developing during labor, the sudden death of the mother just before delivery may require the use of forceps. In other cases it might be possible for the mother to deliver herself without assistance, but her suffering would be so great, convulsive, and expulsive pain would cause such laceration that it will spare her suffering and injury if she be completely anesthetized and delivered by forceps.

Danger to the child justifies the use of forceps. Prolapse of the cord, which cannot be replaced, compression of the cord about the child's neck, long-continued labor with birth pressure, rise in temperature in the mother, indicating some infection which may attack the child, and fetal movements and heart sounds growing weaker, indicate prompt delivery.

Conditions Making Forceps Delivery Justifiable.—The head must have engaged in the pelvic brim and molded itself into the pelvic brim before the use of forceps is justifiable. It has been abundantly shown that the use of forceps upon the head not engaged above the pelvis or but just beginning to enter the brim is followed by dangerous pressure, often by cranial and intracranial hemorrhage, and permanent injury to the nervous system. In many cases the child dies as the consequence. With other obstetric operations

as successful as are now pubiotomy and Cesarean section, unless the child is to be deliberately sacrificed, the forceps should not be applied to the head until engagement and molding have occurred. If it is proposed to sacrifice the child, craniotomy is safer for the mother than difficult forceps extraction, the head not being engaged.

The operator should know that the pelvis is of sufficient size to permit the passage of the head. Engagement and molding is a practical demonstration of this fact, so far as the upper pelvis is concerned;

Fig. 105.—Forceps slipping from the unengaged head (Bumm).

there may be, however, contraction at the pelvic outlet sufficiently great to destroy the life of the child during its exit. Pelvimetry, then, should be practised before forceps extraction and the measurement of the outlet included. Pelvimetry should include palpation of the pelvic cavity, as well as measurement by the hand and the pelvimeter. For successful forceps operation the cervix must be dilated or readily dilatable to its full extent by the hand, the membranes should be ruptured before the instrument is applied, the

bladder of the patient should be completely emptied under anesthesia by the catheter, the rectum should have been emptied by injection, and aseptic and antiseptic precautions should be observed. A competent anesthetizer and assistant should be at hand, and the necessary appliances for checking hemorrhage, preventing infection, and repairing lacerations. If these conditions and surroundings cannot be commanded, a physician will do well to abstain from the application of forceps and summon competent aid.

Fig. 106.—Forceps slipping from the unengaged head (Bumm).

Contraindications for the Use of Forceps.—Failure of the head to engage and partially descend, brow presentation, parietal bone presentation, posterior rotation of the chin, a fetus complicated by a tumor or pathologic conditions making its delivery impossible, contraction at the pelvic outlet, stenosis of the vagina and pelvic floor, partial dilation of the cervix with infiltration with malignant or scar tissue, and the presence of a dead child in a contracted pelvis, form the principal contraindications for the use of forceps. The un-

ruptured condition of the fetal membranes is so easily remedied that it can scarcely be considered an essential condition.

Technic of Forceps Delivery.—Forceps delivery should not be attempted unless the operator is prepared not only to extract the child and empty the uterus, but to control hemorrhage, prevent infection, and repair lacerations. A less complete operation cannot be considered the satisfactory use of forceps. The skilful use of the forceps under surgical anesthesia not only does not predispose to laceration, but helps greatly to avoid it. After complete anesthesia the operator with the forceps has good control of the head, the pelvic floor and perineum are relaxed, and delivery is effected at his pleasure. In patients, however, who require the application of forceps, the vagina is often but partially dilated, the patient generally is poorly developed, and hence laceration often occurs in these cases.

The forceps should be prepared for use by sterilization by boiling. If the instrument be boiled in 1 per cent. lysol for twenty minutes it is sterile, and also sufficiently lubricated to permit its easy introduction. The operator should not only prepare the forceps, but instruments for packing the womb with gauze, and for the repair of lacerations. If the case promises to be difficult, it may be well to have more than one kind of forceps ready; thus, Tarnier's and Simpson's might both be in readiness.

A patient is prepared for the use of forceps by shaving or trimming away the hair upon the external parts, thoroughly washing the external parts with soap and water, then with sterile water, then with bichlorid of mercury solution (1 : 2000). The rectum should have been thoroughly emptied by a copious enema. The patient should be catheterized only under ether and relaxed, as the bladder can then be most efficiently emptied. If the head has partly descended, it may be necessary to make pressure through the vagina upon the head in order to introduce the catheter, as the urethra may be pressed upon by the presenting part.

The patient is placed in the dorsal position upon a high bed or table, the thighs supported and rotated outward by a sling or by

assistants. We have found the use of a sheet folded in the longest way especially advantageous in separating the lower extremities. The sheet is placed behind the patient's neck and over the shoulders, the legs and thighs are flexed, and the ends of the sheet are tied about the leg over the external aspect just below the knee. The lower extremities are then flexed and rotated slightly outward. The sheet can be readily adapted for this purpose, as it is clean, simple, and easy to apply. In difficult cases the limbs should be separated by an assistant, who can flex or extend the thighs as the operator may desire. The lower extremities and abdomen of the patient should be covered by sterile linen, and we have found a pair of large stockings, terminating in a small square sheet, exceedingly useful for this purpose. This is sterilized before application, cannot become disarranged during delivery, and is thoroughly efficient. In uninfected patients, if the head is not low upon the pelvic floor, a copious douche of lysol (1 per cent.) should be given before forceps extraction. If the head is so low that the mouth and eyes of the child may be entered by the fluid, the vagina should be gently cleansed with cotton sponges dipped in antiseptic solution.

At the time of application the patient should be completely anesthetized by ether and in a thoroughly satisfactory condition. She should be under the charge of a competent anesthetizer, who will entirely relieve the obstetrician from anxiety concerning her safety. The anesthetizer should also be prepared to stimulate uterine contractions when desired. Under antiseptic precautions the operator should then, with a gloved hand, palpate the head with the entire surface of the hand and map out its location and its relative position in the pelvis. The importance of this deliberate palpation of the head before forceps delivery cannot be too strongly emphasized. It is not sufficient simply to introduce one or two fingers before introducing the forceps. While palpating the head, if rotation is deficient, the operator should grasp the head and endeavor to secure a more favorable position. As most operators are right-handed, the right hand is often employed for examinations. When the head is

in a favorable position, if the cervix is not satisfactorily dilated, the operator may dilate it further with the hand, if possible, carry the anterior lip of the cervix over the occiput, and release it from pressure between the pelvis and the head. It will do much to prevent laceration of the cervix if the head is out of the cervix before the forceps is applied.

Fig. 107.—Forceps delivery: introducing the left blade of Simpson's forceps with tapes.

With the right hand between the pelvis and the head, the left blade of the forceps, grasped at its middle by the left hand, is introduced along the palmar surface of the operator's right hand. For introduction the blade should be held parallel with Poupart's ligament on the side opposite the head, the cephalic portion raised upon the thumb of the hand whose fingers are inserted, and allowed to glide

into place by a gentle and rotary motion. If the conditions are favorable, it fits easily upon the fetal head. This blade should be held in position by an assistant while the operator introduces the left hand at the right side of the mother's pelvis, and inserts the right blade in a similar manner. This is usually more difficult of insertion than the left, because the left blade is somewhat in the way and

Fig. 108.—Introducing the right blade of Simpson's forceps with tapes.

the available space is less. Especial care should be taken to insert the right blade properly and to fit it accurately upon the head. With the blades thus applied, a gentle effort should be made to lock them; if they are accurately applied the forceps locks itself, if not, the blades may be shifted slightly until they lock without undue pressure. Before making traction the operator should examine thoroughly to see that the blades are properly applied, and that no maternal

tissue is included in their grasp. He should also determine how tightly they are fitting upon the child's head.

Traction should be made, if possible, during uterine contractions. The neglect to observe this precaution is sometimes followed by severe hemorrhage. When the operator is ready, the anesthetizer should rub the uterus until the contraction begins. The operator may then make traction, and the endeavor should be to continue the uterine contraction during the operator's effort. In almost all cases traction should first be downward and backward, even if the head is upon the pelvic floor, to secure complete flexion or extension, and, if possible, to arouse the action of the pelvic floor. Traction should be intermittent if Simpson's forceps be used, the operator relaxing the blades between the tractions to relieve pressure upon the fetal head. When the pelvic floor has been reached, rotation will usually have occurred, if already not present. Traction should be in the axis of the birth-canal, which will best accomplish rotation. In delivering the head over the pelvic floor the operator must remember that while the line of force is upward and forward, this line does not impinge against the pubes. If the head be drawn too strongly toward the pubic bone, laceration of the anterior segment of the pelvic floor may be considerable. In very difficult cases the urethra has been ruptured and the pubic bones separated. The aim of traction should be to cause the occiput to engage normally under the pubes. When this has been accomplished, the occiput being sufficiently advanced to permit extension, the face and chin are cautiously raised over the pelvic floor. During this maneuver complete anesthesia is necessary. The passage of the head over the pelvic floor may cause great pain, the muscles will be thrown into spasm, the patient will struggle, and severe laceration may occur. If complete relaxation be present, laceration is less and suffering is prevented.

During the delivery of the head the operator may grasp the forceps handles with one hand, and with the other apply a compress of gauze, wrung out of hot bichlorid solution (1 : 4000), across the

pelvic floor at the region of the anus, completely covering the anus at the moment of expulsion (Fig. 110). This will assist somewhat in preventing laceration, and will also prevent the contents of the bowel from escaping and infecting lacerated surfaces. If, as the head is about to emerge, the operator sees that serious laceration is inevitable, he may prefer to perform episiotomy. This is done by

Fig. 109.—Delivery with Simpson's forceps and tapes: pulling downward and backward with the tapes.

inserting a blunt-pointed bistoury or a blunt-pointed pair of scissors at one side of the sphincter of the vagina at the junction of the upper two-thirds and the lower one-third. A cut is made outward and slightly downward of not more than $1\frac{1}{2}$ inches. If necessary, episiotomy may be bilateral. The pelvic floor and perineum instantly retract and the delivery of the head is readily accomplished.

As soon as the head is delivered, the anesthetic should be removed from the patient's face. A few moments' delay may be utilized in cleansing the mouth and eyes of the child, and if the cord is about the neck or pinched in the pelvis the cord should be gently drawn upon and loosened. After a few moments the uterus should be rubbed and stimulated to contraction and the child brought down until the

Fig. 110.—Forceps delivery: extraction of the head over the pelvic floor.

operator has access to the shoulders. Then, with the fingers in the posterior shoulder, making traction downward and backward, if the shoulders have not already engaged beneath the pubic bone, they should be brought down. Anesthesia should again be continued and the shoulders delivered, the posterior shoulder first and then the anterior, by causing lateral flexion of the trunk. It is desirable to

control the patient during the delivery of the shoulders, as lacerations by the child's elbow sometimes happen.

Fig. 111.—Extraction of the head with forceps protecting the pelvic floor (Nagel).

When the child has been delivered, anesthesia should be suspended during the delivery of the placenta.

Variations in Forceps Operations.—While we have described the

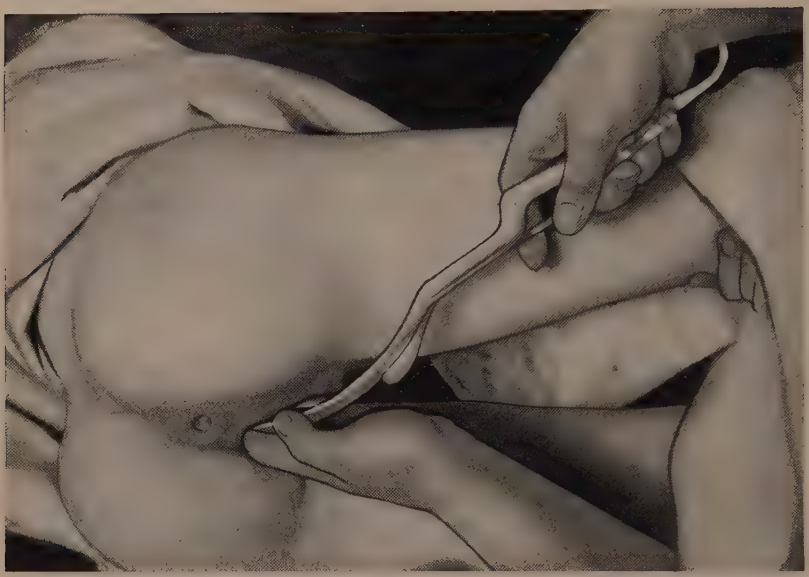

Fig. 112.—The use of the forceps with the patient in the left lateral posture. Introduction of the lower or left blade (Kerr).

Fig. 113.—Delivery of the patient in the left lateral posture. Introduction of the right or upper blade with the axis-traction forceps (Kerr).

usual application and use of the forceps, experiences may arise which may require a very different procedure.

Many operators prefer to place the patient upon her side for

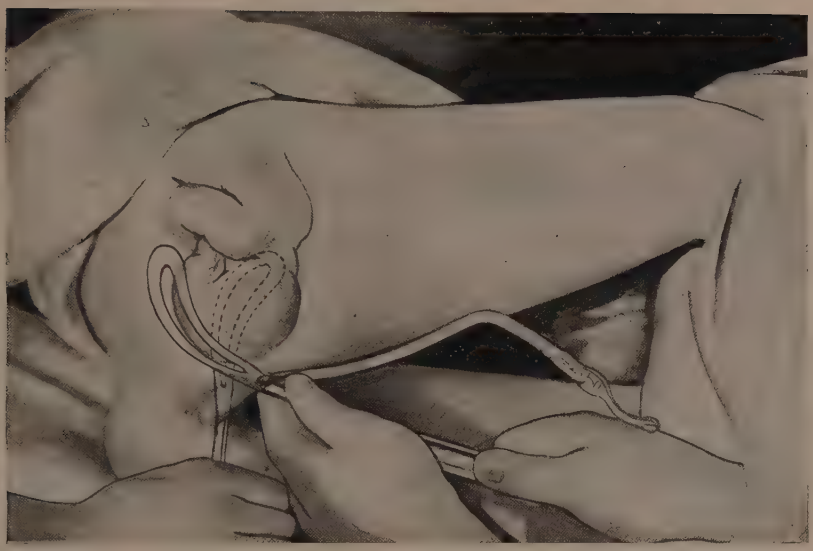

Fig. 114.—Delivery of the patient with axis-traction forceps in the left lateral position. Rotation of the right or upper blade in the hollow of the sacrum to the child's head (Kerr).

Fig. 115.—Delivery of the patient in the left lateral posture with the axis-traction forceps. The blades are locked, the traction rod of the right blade in front now carried back beside the left one (Kerr).

a forceps delivery. She is thus in a position very advantageous for traction downward and backward, the hips being at the

Fig. 116.—Delivery of the patient in the left lateral posture with axis-traction forceps. The forceps applied and locked (Kerr).

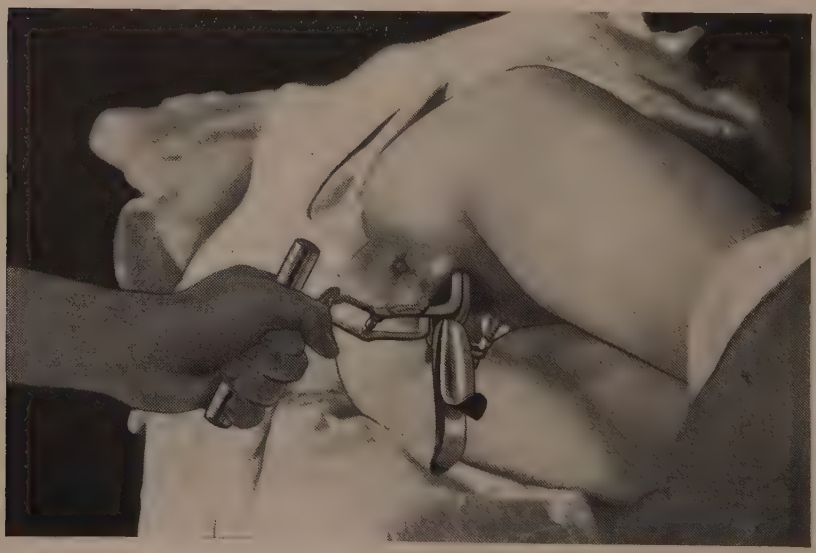

Fig. 117.—Delivery by axis-traction forceps in the left lateral posture: traction downward and backward with the traction rods (Kerr).

edge of the bed or table, the perineum and pelvic floor are free to dilate, and in the high application of the forceps at the pelvic

brim this position has much to commend it. Its practice is less often employed in America than it might be.

A more efficient procedure, where the head descends through the pelvic brim with difficulty, is the use of Mercurio's or Walcher's position (Fig. 119). In this the patient is held by two strong assistants and her sacrum raised upon the edge of a table which has been thoroughly padded to prevent injury. The lower extremities hang freely mobile and are rotated outward. The bladder must be emptied

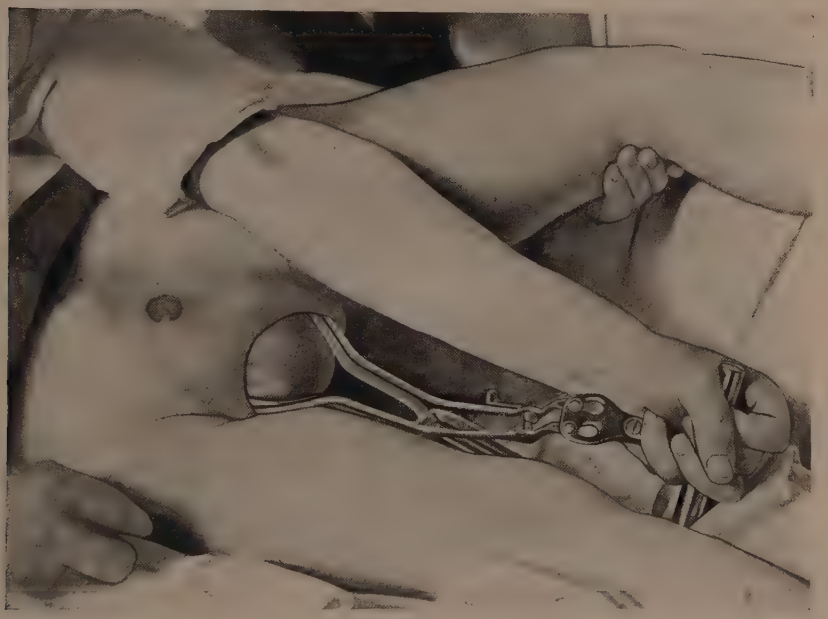

Fig. 118.—Delivery of the patient in the left lateral posture with axis-traction forceps, the head passing over the pelvic floor and perineum (Kerr).

with especial care before the forceps is applied. The operator then sits beneath the edge of the bed or table in such a position that traction is made directly downward and backward. The forceps is then applied as accurately as possible to the sides of the head, and traction made downward and backward until the pelvic floor has been reached. When the head is well upon the pelvic floor and rotation has been effected, the patient may be drawn upward and backward upon the table, the lower extremities flexed, and delivery completed.

After symphysiotomy and pubiotomy the forceps is applied to the head as in ordinary cases. In making traction especial care must be taken to avoid bringing the head against the cut ends of the pubic bone; the pelvic floor and perineum may be sacrificed, if necessary, to avoid this accident. Laceration of the anterior vaginal wall after pubiotomy or symphysiotomy is a serious accident, often followed

Fig. 119.—Using the axis-traction forceps with the patient in Walcher's position (Kerr).

by hemorrhage and infection. The same caution applies to the use of forceps after vaginal Cesarean section, when the lower uterine segment may be injured if traction is made in an improper manner. This is also true of the use of forceps after suprasymphyseal extraperitoneal section.

The High, Middle, and Low Application of Forceps.—Writers

often attempt to distinguish various forceps applications by reference to the position of the fetal head. This distinction is of more theoretical than practical value. The same principles of application, the same necessity for axis-traction, the same instruments and appliances are necessary for all forceps applications. As other operations have excluded the application of the forceps to the head which is not engaged, it is best, we think, to consider forceps applica-

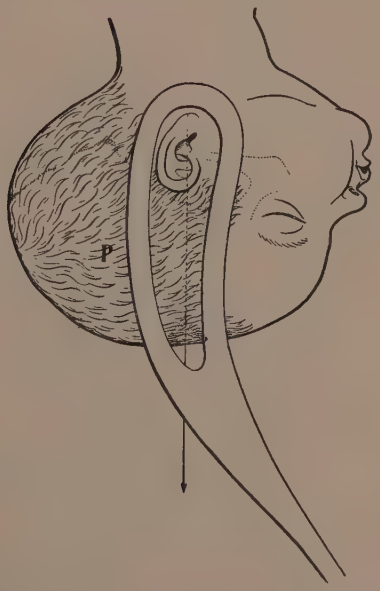

Fig. 120.—Ineffectual application of the blades of the forceps to the sides of the child's head without flexion (Farabeuf and Varnier).

tions with reference to the proper use of the instrument, and not to the position of the fetal head.

The Forceps in Deficient Rotation.—Here, as we have indicated, under complete anesthesia the operator's first effort is to rotate the head sufficiently with the hand to get the occiput in front of the median line, when the forceps may be applied to the sides of the child's head. Axis-traction will bring the forceps and the head together upon the pelvic floor, and then into the median line. In difficult cases, where the forceps cannot be placed upon the sides of the

head, Simpson's forceps should be applied in the oblique pelvic diameter, traction made in the axis of the pelvis, the grasp of the blades being relaxed between contractions, and the head encouraged to rotate within the forceps blades.

Fig. 121.—Forceps in first position of vertex, with incomplete rotation (Bumm). Naegele forceps.

In some cases the occiput, much to the disappointment of the operator, will rotate directly backward instead of forward. In these cases some advise the abandonment of the use of the forceps, the pushing of the head upward, and the completion of labor by

version. If the head is easily dislodged, this may be done; if it is firmly engaged upon the pelvic floor, such an effort might cause rupture of the uterus. The occiput can be delivered posteriorly if extreme flexion can be maintained and if the pelvis and the child's

Fig. 122.—Forceps in second position of vertex, with incomplete rotation (Bumm). Naegele forceps.

head are of proportionate size. Considerable laceration of the pelvic floor is inevitable, although we have rarely seen it extend into the rectum. The forceps being accurately applied to the sides of the child's head, traction is made slightly downward and backward, the occiput pressing strongly into the pelvic floor until the fore-

head of the child engages beneath the pubes. The operator may then endeavor to cautiously raise the occiput from the pelvic floor, while the forehead pivots beneath the pubic bone. It may be necessary to loosen the grasp of the forceps, depress the handles, and take a slightly different hold upon the fetal head. If this cannot

Fig. 123.—Forceps obliquely over the head, first position of vertex, with incomplete rotation (Bumm). Naegele forceps.

be accomplished, traction must again be resumed until the head can thus be delivered. Complete laceration of the perineum and pelvic floor may be avoided by surgical anesthesia, by securing extreme flexion of the head while passing over the pelvic floor, and by unilateral or bilateral episiotomy.

Complications and Injuries Caused by the Forceps.—It may

seem incredible that an educated physician would attempt to drag the fetal head with the obstetric forceps through a pelvis too small for it. Yet those who see cases brought into hospitals and who have a consultation practice will admit with regret that such is the case. The simple rule of practice which asserts that after a reasonable

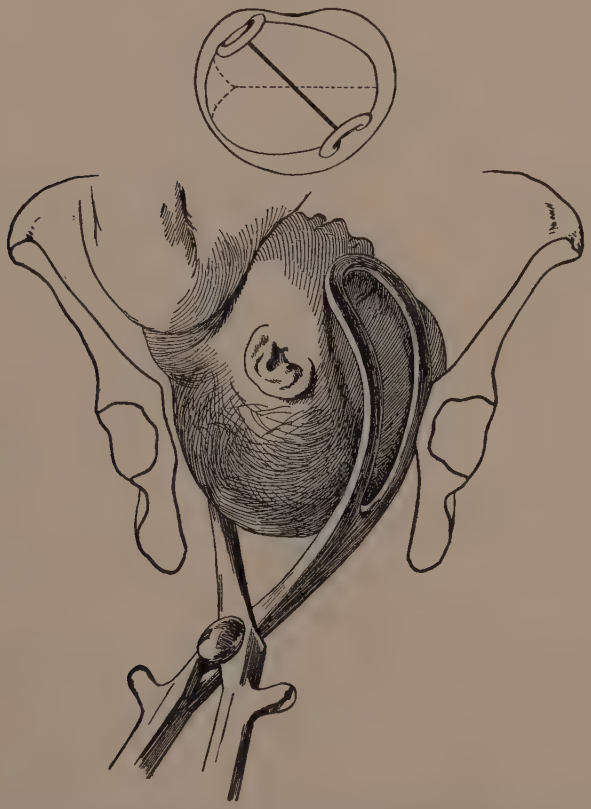

Fig. 124.—Forceps obliquely over the head in second position of vertex, with incomplete rotation (Bumm).

time, the head not descending, it must be pulled down, and that if one physician cannot pull it down, two or more can, is sure at some time to bring its follower into an obstetric disaster. It may be too much to expect the general practitioner to know and practice pelvimetry or for the recent graduate to provide himself with a pelvimeter. But recent graduates are taught to recognize engagement

of the fetal head, and general practitioners should have learned the same lesson. It would be better for the patient if no attempt be made to deliver and the child die than to have forcible attempts at delivery with great disproportion. Those who urge that if the pelvis be accurately measured and found to be normal, the head, though

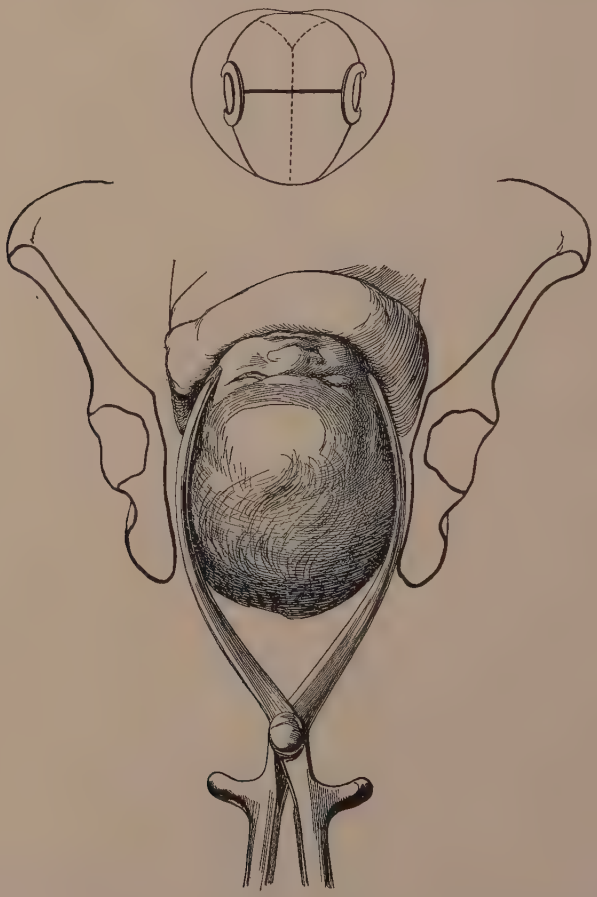

Fig. 125.—Forceps in posterior rotation of the occiput (Bumm).

even not engaged, may be grasped by the forceps and safely delivered, omit one important factor in the problem. We have as yet no reliable and accurate method for measuring the fetal head within the womb. Our only efficient and reliable test is the presence of engagement and molding; if this be absent, efforts at delivery by trac-

tion are purely experimental. The least injury which can follow such efforts is damage to the child's nervous system, or its death from the exercise of pressure, while the mother may escape with more or less laceration.

Separation of the symphysis pubis, laceration of the urethra and anterior segment of the pelvic floor, laceration of the posterior seg-

Fig. 126.—Examining the torn cervix drawn downward for repair.

ment and opening of the posterior vaginal cul-de-sac into the peritoneal cavity, may follow the improper use of the forceps. The writer had occasion to deliver a woman by abdominal section into whose abdominal cavity a physician had thrust a blade of a Tarnier forceps in the effort to apply the instrument above the pelvic brim. The rent, measured through the abdomen, admitted four fingers, and

was successfully closed from above. The slipping of the forceps may cause severe and cutting lacerations, and the violent use of a poor instrument may break the forceps, leaving a portion of the forceps within the womb. The forceps may be applied over the unruptured membranes and traction made, partially or completely separating the placenta, followed by violent hemorrhage. A loop of cord may be pinched by the forceps, causing the death of the child. In old primiparæ, or in patients who have previously sustained injury to the coccyx, delivery by the forceps may break the coccyx at its junction with the sacrum. This may produce great distress during the patient's convalescence. It can be readily understood that the use of the forceps offers unusual opportunities for the conveyance of septic infection; hence, our best efforts are demanded to make the use of the instrument safe for mother and child.

Injuries to the Child Caused by the Forceps.—Facial paralysis from pressure upon the facial nerves not uncommonly occurs. Unless pressure has been severe, recovery shortly follows. Fractures of the cranial bones with intracranial bleeding are not uncommon after violent delivery through a contracted pelvis. Bruises and wounds of the scalp and abrasions upon the skin of the face may occur in difficult forceps operations in skilful hands. In the writer's experience, a patient having a contracted pelvis had repeated and fruitless efforts at forceps delivery made by her attending physician. When admitted to a hospital it was necessary to deliver her by abdominal section. The child's face was badly bruised and swollen, especially in the region of the orbits and over one eye. The loss of sight in this eye subsequently occurred through rupture of some of the membranes of the eye and the escape of the media. Direct injury to the eye by forceps is unusual and can only occur after severe and indiscriminate traction. In applying the forceps to the breech of the child, slipping or improper application might cause injury to the genital organs, or wounding and bruising of the bladder might occur if the forceps be improperly applied. In applying the forceps to the after-coming head the face is often bruised during forcible extrac-

tion over the pelvic floor. The improper application of the instrument over the occiput and face frequently causes severe wounds.

The Frequency and Results of Forceps Operations.—It is impossible to estimate accurately the frequency of forceps operations, as the necessity for their use depends so much upon the nervous condition of the patient. In large European clinics, filled with stolid peasant women, exhaustion is comparatively rare. With American women, illustrating in varying degrees the degenerating influence of luxury, the use of the forceps is very common. It is in cases where nervous exhaustion must be avoided and the patient's strength strongly conserved in every way that the use of the forceps is very successful. Improperly applied and without proper antiseptic precautions in these cases the forceps may cause unnecessary laceration and tend to make the patient a lasting invalid.

The results of the use of the forceps depend very largely upon the skill and technic of the operator. Thus, it is possible for a skilful and careful obstetrician to use the forceps for years without maternal mortality resulting from the instrument. On the other hand, the improper use of forceps may be followed by double mortality. It must be understood that, in normal proportion between mother and child, in skilful hands the use of the forceps has no maternal mortality and very slight morbidity. In 100 cases of high application of the forceps, Rimmen[1] had no maternal mortality which could be ascribed to the operation itself. Deaths occurred from eclampsia developing before the operation; 81 per cent. of these patients had a normal puerperal period, while 6 per cent. had complicated recovery; 5 had localized infection; 3, exudate in the pelvis; 1, cystitis; 1, thrombosis. The puerperal period was free from fever in one-half of the cases, while three-eighths had a temperature rising to 104° F., one-eighth reaching above 104° F. Injuries resulting from the high application of the forceps were: lacerations of the pelvic floor and perineum, laceration of the vagina extending to the pelvic bones in 1 case, deep laceration of the cervix in 1, rectovaginal fistula in 1,

[1] Monatsschrift f. Geb. u. Gyn., Band 25, Heft 2, 1907.

paralysis of the perineal nerve in 1, and fistula between the ureter and bladder and vagina in 1. Of the 100 children, 69 were discharged in good condition. The mortality among the children was 31 per cent. Many of these were in bad condition before operation was undertaken; 12 children perished during delivery, and 10 after. Among these the umbilical cord was injured twice. Among the cases in which the head was molded before the application of forceps the fetal mortality was 11 per cent. Where the forceps was applied to the head not molded the mortality was 36 per cent. The children surviving suffered from pressure upon the parietal bone in 1 case, pressure and indentation of the forehead in 3, fracture of the cranium in 2, and the formation of hematoma in 1. In the 100 cases the maternal mortality from the operation was nil; 16 per cent. of the mothers had prolonged puerperal periods with fever; 7 of the mothers had lacerations of considerable extent. Thirty-one per cent. of the children perished, and 10 per cent. of the surviving children sustained considerable injury.

In the clinic at Basle, in 10,913 cases of labor, the forceps was applied in 3.27 per cent. of cases. Among these, 78.3 per cent. were primiparæ. The most usual indication was threatened exhaustion. The maternal mortality was .97 of 1 per cent., from fatty heart, eclampsia, and rupture of the uterus. In 8 cases there was severe infection, and mild infection in 36 per cent. The fetal mortality was 10.5 per cent. from intracranial hemorrhage, and in a considerable number of cases there was decided laceration of the child's scalp. In the Dresden clinic, Leisewitz,[1] in 27,238 labors, found 2.55 per cent. forceps applications. The most prevalent indication was danger to the child from birth pressure; next, threatened exhaustion; and then in the interests of mother and child. When the fetal heart sounds dropped to 80 or 100, or rose above 160, with or without the escape of meconium, the forceps was used in the interests of the child. When the mother was becoming exhausted, with signs of interference in the fetal circulation, or fever in the mother with

[1] Archiv f. Gyn., Band 81, Heft 3, 1907.

beginning asphyxia in the child, the forceps was applied. In the mother's interest, eclampsia, nephritis, heart lesions, pulmonary tuberculosis, threatened failure of uterine contractions, and rapidly increasing contraction-ring, premature rupture of the membranes, and hemorrhage, all furnished indications. The results in Continental clinics show that the forceps is invariably used under favorable conditions where the interests of the child are threatened. There is considerable difference of opinion concerning its use for the mother only. In contracted pelves the forceps was most often applied in justominor or symmetrically contracted pelves. As regards the situation of the head in these operations, it was in the entrance of the pelvis or upper pelvis in 5.31 per cent.; in the pelvic cavity in 50.21 per cent., and in the outlet of the pelvis in 4.45 per cent. The application of the forceps in the pelvic brim was made in contracted pelves where the head had engaged. The relative application in the mothers was 79.5 per cent. in primiparæ, the multiparæ being 20.95 per cent. The mortality of the mothers from all causes was 3.21 per cent.; if eclampsia be excluded and forceps applications only considered, the mortality was reduced to .58 of 1 per cent. The fetal mortality was 15.63 per cent.; fractures and compression in 4.73 per cent., asphyxia in 6.59 per cent., and deaths from other causes developing soon after birth in 4.3 per cent. Under the most careful analysis fetal mortality was reduced to 10.68 per cent. Where the forceps was used in the interests of both mother and child the fetal mortality was 13.93 per cent. In this series the corrected fetal mortality was 11.54 per cent. It is curious to observe that in normal pelves the fetal mortality was 14.28 per cent.; in 5.95 per cent. the improper use of the instrument was the cause of the mortality. When the pelvic outlet was contracted the fetal mortality was 8.5 per cent. The mother sustained injury requiring suture in 73.6 per cent. Among the children 5.45 per cent. had paralysis of the facial nerve; 1.15 per cent. had paralysis of a nerve plexus.

That severe laceration can follow the high application of the

forceps is illustrated in a case of Puppel's.[1] The patient was a very large multipara, whose three previous labors had terminated spontaneously. In the fourth the head failed to descend and remained above the inlet of the pelvis. The child's heart sounds grew weak and version was attempted, but failed. The patient was then placed in Walcher's position, the head pressed strongly downward, and the forceps applied in the transverse diameter of the pelvis. The uterus contracted strongly, and with suprapubic pressure the child was delivered in thirty minutes. The cord was about the neck and the child was asphyxiated, but revived. The mother had no laceration in the cervix or perineum and the placenta was readily delivered. After delivery the urine became bloody, the patient had pain on the right side above Poupart's ligament, with dulness on percussion, which grew worse, followed by collapse. She was taken to a hospital and after anesthesia an incision made over the right Poupart's ligament. Very offensive urine escaped from the incision, with particles of gangrenous tissue. Laceration had occurred, which extended to the base of the bladder in front, and posteriorly to the posterior spine of the pelvis. Death followed shortly after. Although a complete autopsy was impossible, it was found that the tissue outside the bladder at the sides of the pelvis had been lacerated, the bladder bruised, urine had extravasated, and infection had developed. Injury had occurred during the forceps delivery, made more easily possible by Walcher's position. In prolonged labor the base of the bladder becomes intensely congested and severe pressure may cause necrosis and gangrene.

The attempt to deliver the head at the pelvic brim without uterine contractions is a dangerous procedure. The writer recalls the case of a stout, vigorous multipara, who, during a preceding pregnancy, had gone some time over the usual limit of gestation. Labor was then induced by bougies and bags; the latter were applied at intervals for twenty-four hours, causing intense suffering. A difficult forceps delivery terminated in the birth of a child whose

[1] Monatsschrift f. Geb. u. Gyn., Band 25, Heft 4, 1907.

cranium is permanently marked with an indentation caused by the forceps. In the following pregnancy the question arose as to what should be done with this patient. It was thought that the patient should be anesthetized with ether and that the head could be brought into the pelvic brim and delivered with forceps, making an immediate delivery and avoiding the suffering and delay of induced labor. The pelvis was ample in size, the position and presentation of the child normal, and the advice was given to allow the pregnancy to go on until the uterus acted spontaneously; if the head engaged, then to deliver with forceps under ether; if engagement did not occur, to perform whatever operation might be necessary.

This advice did not suit the impatient patient. Her family physician was persuaded to anesthetize her and to deliver with forceps. During anesthesia she was seized with heart failure from which she was revived with difficulty. The child was extracted with forceps as rapidly as possible, and was dead-born through birth pressure.

In cases where the mother has had a painful experience in former labor, her apprehension may be so great that the coming confinement is viewed with horror. Any interference with the genital tract may be followed by shock, and this is especially apt to occur in the absence of uterine contractions. Under complete anesthesia such patients should be delivered in that manner which causes least mechanical injury and least disturbance.

The use of forceps in contracted pelvis is indicated under one condition only—labor must have developed sufficiently to cause engagement and beginning descent. When this has occurred, if the mother requires assistance, the forceps may be employed to advantage. Scheffzek[1] gives the results of the application of forceps in the clinic at Breslau. In 37 cases it was necessary to terminate labor with pubiotomy once. The mothers recovered, although the puerperal period in many was complicated by rise of temperature and by lacerations; 58 per cent. of the children lived and 42 per cent.

[1]Archiv f. Gyn., Band 88, Heft 3, 1909.

perished. The application of the forceps below the pelvic brim was performed in 60 cases of contracted pelvis, 44 of whom were primiparæ. There was no maternal mortality in these cases. Among primiparæ there was fever during the puerperal period in 16 per cent. The mortality among the children was 15 per cent. This is very similar to the reports of Peham (17.2 per cent.), Bürger (11.6 per cent.), and Bloodwig and Savor (21.7 per cent.).

Although the application of the forceps in face presentations is unusual, Von Herff[1] has had favorable results. Jolly[2] has also delivered the fetus in face presentations successfully with forceps. He reports unsuccessful cases, where the head had not properly engaged, with posterior rotation, and would limit the use of the instrument in face presentations to favorable positions of the face.

In comparison with other operations the skilful use of the forceps in selected cases is without maternal mortality, has a maternal morbidity of about 10 per cent., and a fetal mortality of not less than 10 per cent. In improperly selected cases, disregarding the absence of engagement and molding, the use of the forceps has a direct maternal mortality of from 3 to 5 per cent., a maternal morbidity of 20 to 30 per cent., and a fetal mortality of 30 to 50 per cent.

Bibliography

Forceps Delivery: Indications For

Barta: Orvosi Hetilap., No. 29, 1907.
Boerma: Zentralblatt f. Gynäkologie, No. 20, 1907.
Brodhead: American Journal of Obstetrics, May, 1904.
Brown: Journal of Obstetrics and Gynecology of the British Empire, p. 503, 1907.
Demelin: Zentralblatt f. Gynäkologie, No. 2, 1907.
Eisenstein: Gyn. Rundschau, p. 650, 1907; Zentralblatt f. Gynäkologie, No. 3, 1909.
Jolly: Zentralblatt f. Gynäkologie, No. 50, 1907.
Jones: Journal of Obstetrics and Gynecology of the British Empire, November, 1906.
Klatscko: Zentralblatt f. Gynäkologie, No. 21, 1909.

[1] Heger's Beiträge zur Geb. und Gyn., Band 12, Heft 1, p. 1, 1907.
[2] Zentralblatt f. Gyn., No. 50, 1907.

Kynock: British Medical Journal, July 23, 1904.
Lacky: Zentralblatt f. Gynäkologie, No. 47, 1909.
Leisewitch: Archiv f. Gynäkologie, Band 81, 1907.
McDonald: American Journal of Obstetrics, Feb., 1910.
Muss: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 1, 1905.
Neumann: Zentralblatt f. Gynäkologie, No. 10, 1900.
Oskar: Zentralblatt f. Gynäkologie, No. 3, p. 72, 1907.
Popescul: Zentralblatt f. Gynäkologie, No. 29, p. 908, 1907.
Reed: Surgery, Gynecology, and Obstetrics, January, 1906, and June, 1906.
Riemann: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 4, 1907.
Simpson: Scottish Medical and Surgical Journal, December, 1900.
Willson: Lancet, p. 1088, 1909.
Winckel: Zentralblatt f. Gynäkologie, No. 48, 1903.
Zangemeister: Zentralblatt f. Gynäkologie, No. 20, 1908.
Zernik: Zentralblatt f. Gynäkologie, No. 47, 1909.

Forceps Delivery: Complications and Injuries

Bokelmann: Zentralblatt f. Gynäkologie, No. 15, 1900.
Kynoch: British Medical Journal, July, 1904.
Leopold: Zentralblatt f. Gynäkologie, No. 16, 1902.
Puppel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 4, 1907.
Ritter: Zentralblatt f. Gynäkologie, No. 41, 1903.
Savidge: American Journal of Obstetrics, August, 1905.

Forceps Operations: Results of

Baisch: Therapie des engen Beckens, Leipzig, Georg. Thieme, 1907.
Bokelmann: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 45, Heft 1, 1901.
Discussion: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 4, 1905.
Gans: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 27, Heft 4, 1908.
Hammerschlag: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, 1907.
Hegar: Beiträge z. Geburtshülfe und Gynäkologie, Band 12, 1907.
Hofmeier: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 59, 1907.
Kretschmer: Inaug.-Diss., Breslau, 1907.
Küstner: Zentralblatt f. Gynäkologie, No. 37, 1907.

Leisewitz: Archiv f. Gynäkologie, Band 81, 1907.
Leopold: Archiv f. Gynäkologie, Band 81, 1907.
Mehrmann: Zentralblatt f. Gynäkologie, No. 31, 1907.
Rissman: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, 1907.
Scipiades: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, 1907.

VERSION

By version is understood such alteration in the position of the fetus as enables the operator to clasp the body of the child for delivery, or bring the long axis of the fetus parallel with that of the mother's birth-canal, and render delivery possible. One of the oldest operations in obstetric surgery, version has been overshadowed by operations requiring incision The fact that it can be performed in emergencies by a physician without skilled assistants, that it gives the physician immediate control of the fetus, and that it is most useful in some of the most important complications of parturition, makes it especially valuable.

Varieties of Version with Reference to the Fetus.—Version may be cephalic or podalic, as the upper or lower extremity is brought to the pelvic brim. With reference to the mother, version may be external, internal, or combined.

By prophylactic version in contracted pelvis is understood version which brings the breech first through the pelvis, the aftercoming head turning transversely at the pelvic brim. In a simple flat pelvis this position of the head is especially favorable for successful delivery.

The Indications for Version.—The most obvious indication for version is an abnormal position of the fetus, which threatens rupture of the womb unless it be rectified. Shoulder presentation, transverse position, impaction of the fetus with great distention of the lower uterine segment, and threatened rupture, form the condition where, obviously, measures must be taken to alter the position of the fetus to avoid rupture of the womb. If the condition is just developing, it may be possible to perform version without

embryotomy. But, if the stretching of the lower uterine segment is extreme and the uterus in tetanic contraction, embryotomy must first be done and delivery effected by version and extraction.

Prolapse of the cord, in which efforts at reposition are not successful, is best treated by carrying the cord above the pelvic brim,

Fig. 127.—Anterior rotation of the occiput by combined manipulation (Kerr).

performing version, and proceeding to extraction. Hemorrhage from the various kinds of placenta prævia can be controlled with the sacrifice of the fetal life, by turning the child and using it as a plug. Positions of the fetal head which defeat efforts at forceps delivery, such as brow presentation, parietal bone presentation, posterior impaction of the occiput, or face presentation, may often be termi-

nated by version under deep anesthesia, followed by extraction. In labor in contracted pelves, version must be selected only in simple, flat pelves, when it is definitely known that the internal antero-

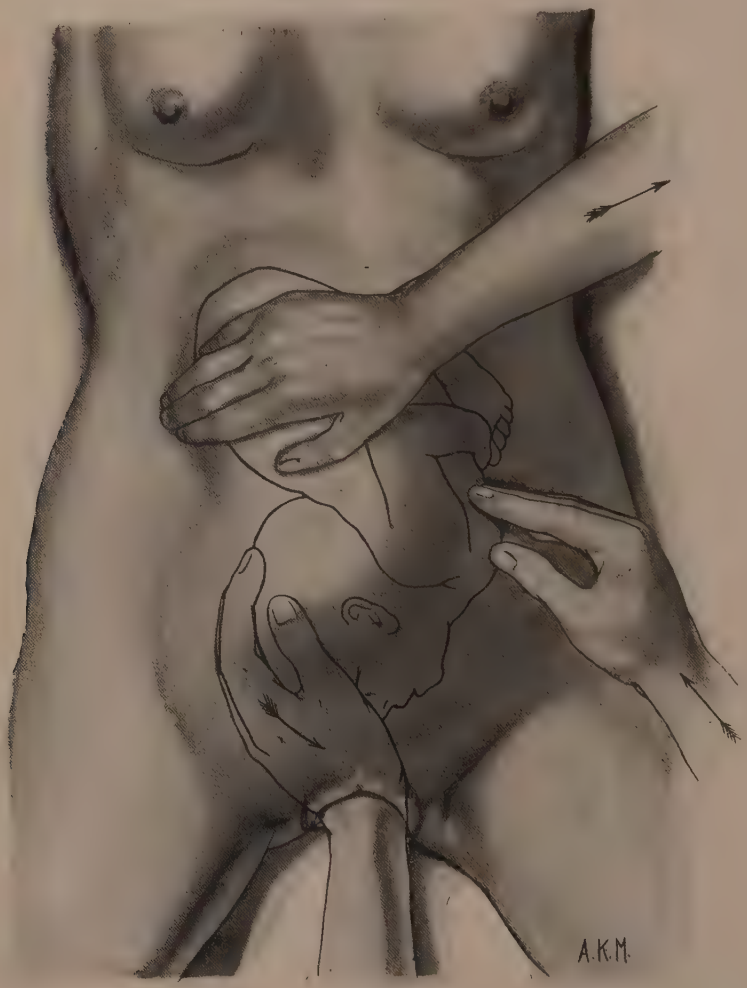

Fig. 128.—Thorn's method for converting a face into a vertex presentation. The arrows indicate the directions of pressure and traction (Kerr).

posterior diameter is at least 8.5 cm., and the head of the child not excessively large or hard. Version in justominor pelves, in funnel-shaped pelves, in highly rachitic pelves, and in the rarer forms is

usually followed by fetal death and injury to the mother. In complex presentations, where the use of forceps is impossible and it is difficult to map out the fetus, delivery becoming necessary, version will give the best results.

The Essentials for Successful Version and Preparation for the Operation.—For version and its adjunct, extraction, to be successful, the internal anteroposterior diameter of the pelvis must be at least 8.5 cm. and the child not excessive in size. There must be no essential contraction at the pelvic outlet. The uterus must not be in a highly tetanic condition. The urinary bladder must be thoroughly emptied by catheter, and the rectum by injection. If possible, a competent anesthetizer must be available. Aseptic and antiseptic precautions are imperative.

Patients should be prepared for version by rendering the external parts aseptic as thoroughly as possible; the patient should be catheterized when anesthetized completely. Chloroform anesthesia should be employed during version. If the operator is to proceed no further, anesthesia may cease and labor allowed to go on spontaneously. If extraction is to follow version as soon as possible, ether should be substituted for chloroform after version is complete. The patient should be, in most cases, in the dorsal position, with the lower extremities suitably separated. The thighs should be flexed sufficiently upon the abdomen to relax the muscles at the pelvic brim. If external version is to be performed, it is not always necessary to put the patient upon a table. If the operator expects to practice vaginal manipulation immediately after external version, a table or very high narrow bed will be necessary. A copious vaginal irrigation of 1 per cent. lysol should be given before internal or combined version is attempted. The operator should have in readiness instruments and appliances for controlling hemorrhage, giving stimulation, and repairing lacerations. If extraction is to follow, the forceps and instruments for repairing lacerations, with appliances for resuscitation and care of the child must be provided, as danger or injury to the child is considerable.

External Version.—In patients who are not highly sensitive and nervous, in whom the fetus occupies an unfavorable position, or where the contour of the pelvis is such that it is desired to cause a different presentation, an attempt may be made to turn the fetus by external manipulation. If it is the purpose of the operator to institute delivery immediately after, external version should not be undertaken until the cervix is partly dilated or dilatable. It is almost imperative that the membranes be unruptured. The patient should lie upon the back, with the thighs flexed, and if she be excitable, sensitive, or irritable, she should have transient anesthesia with chloroform. The operator should map out the fetus carefully by palpation and auscultation, and determine in which direction he wishes to turn the child. Placing his hands at the extremities of the fetal ovoid, he should endeavor to lift the fetus slightly away from the pelvic brim, and with one hand bring that extremity of the fetus to the brim which he desires to have enter, while with the other hand he carries the opposite extremity upward in the mother's abdomen. This is best accomplished by gentle intermittent efforts, pausing between them, and holding the fetus gently but firmly in its newly acquired position. If the membranes are unruptured, the fetus not excessive in size, and the muscular action of the mother controlled, it may thus be possible to turn the child in the manner desired.

The Retention of the Child After External Version.—While one may succeed in turning the child, it is another matter to retain it in the desired position. Efforts have been made, by placing a long pad on each side of the abdomen, to prevent the fetus from returning to its undesired situation. A firm bandage has been applied over this pad, and the patient kept lying upon that side which would best facilitate descent and engagement. Unfortunately, these efforts are not always successful.

If the fetus is to remain in its desired position after external version, the presenting part must be brought into the pelvic brim and the membranes ruptured, so that definite engagement and mold-

ing will develop. The cervix should at least be thoroughly softened and slightly dilated for this to occur. When these conditions are present the fetus will remain in its desired position. After performing external version, if the operator wishes to proceed to bring the patient into labor, he should dilate the cervix as thoroughly as the conditions will permit and then rupture the membranes. If the head enters the pelvis promptly, not all of the amniotic liquid will escape, and labor will develop with the fetus in the desired position.

The advantages of external version are that, so far as the manipulation is concerned, it exposes the patient to no danger from infection, and, with reasonable skill, there is little risk of injuring the child, the placenta, or the mother. Unfortunately, unless the operator is prepared to bring on labor immediately, the results of external version are so uncertain that it cannot be considered reliable.

Combined Version.—Combined version, often described as Braxton-Hicks' method, consists in altering the position of the fetus by the fingers of one hand introduced within the vagina, aided by manipulation with the external hand.

Indications and Preparation for Combined Version.—Combined version is most often performed for placenta prævia. Its object, in this condition, is to enable the operator to grasp a fetal leg, by traction to bring the breech into the pelvic cavity, compressing the placenta against the pelvic wall and stopping hemorrhage. It is frequently not followed by extraction, and in placenta prævia, as the life of the child is disregarded, its body is used as a plug. Combined version is also employed in cases where the cervix is partly dilated, where some condition arises requiring comparatively prompt delivery or necessitating pressure in the lower portion of the womb. Thus, in eclampsia, with partly dilated cervix, if the operator ruptures the membranes and brings down a leg of the fetus, convulsions will sometimes cease.

To prepare a patient for combined version the usual antiseptic

precautions for vaginal operation should be observed. Chloroform should at first be employed, followed by ether if prolonged manipulations are desired; the patient should be carefully catheterized under complete anesthesia. With the patient upon her back, on a table or high narrow bed, the operator should introduce several fingers of one hand into the vagina and examine the cervix. He

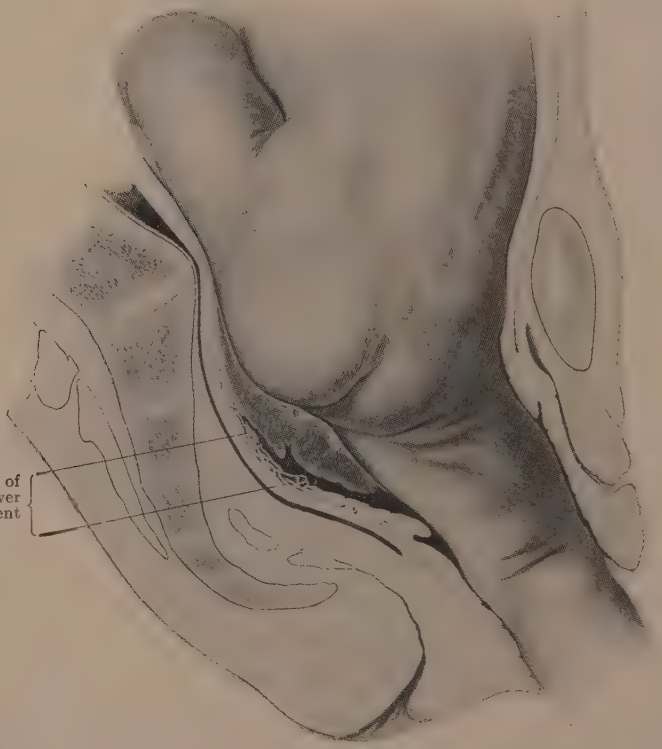

Fig. 129.—The breech as a tampon in placenta prævia (Bumm).

should dilate the cervix as far as possible with the fingers, avoiding at first rupture of the membranes. When he has accomplished as much as possible in this way, the fetus should be pressed gently downward into the pelvis and the membranes ruptured. At this moment the fingers are to be inserted as far as possible and an effort made to grasp one of the feet of the child. This may, at first, be impossible, and the knee may be reached; in other cases the arms pro-

lapse and the operator can find with his fingers nothing but the head and upper extremities. The internal fingers should not be withdrawn, but the external hand should be placed upon the abdomen, the head pushed gently upward, and the lower extremities of the fetus pressed downward. With patience and gentle manipulations it is usually possible to cause the lower extremities to descend into the pelvic cavity, so that one or both feet can be grasped. When this has been accomplished, the breech should be brought into the pelvis and a noose of sterile gauze bandage placed about one foot, so that, if necessary, traction can be made at intervals without introducing the fingers within the vagina. If extraction is not to follow, the vagina should be tamponed lightly with 10 per cent. iodoform gauze. Some prefer to attach a light weight to the noose around the fetal ankle to maintain constant pressure against the cervix, thus keeping the body of the child tightly applied to the sides of the pelvis.

Combined Version for Shoulder Impaction.—In cases of shoulder presentation, if impaction threatens rupture, version may be performed to dislodge the shoulder and bring the head or breech into the pelvic brim. This manipulation requires good judgment, patience, and dexterity. The patient must be placed upon her back upon a bed or table, antiseptic precautions thoroughly made, the bladder completely emptied under anesthesia, and chloroform given to complete relaxation. The position of the fetus being carefully mapped out, the operator introduces one hand within the vagina and, inserting the fingers in the axilla of the fetus, endeavors very gently to lift the shoulder up from the pelvic brim. The patient's thighs should be flexed during this maneuver to relax the muscles at the brim of the pelvis. The external hand should endeavor to dislodge the breech of the child from its position, and carry it gently upward and toward that side of the mother's abdomen upon which the head is resting. If the operator feels that he is moving the child, he will then attempt to raise the child sufficiently high to permit the head to present at the pelvic brim. He may often be greatly aided by intermittent

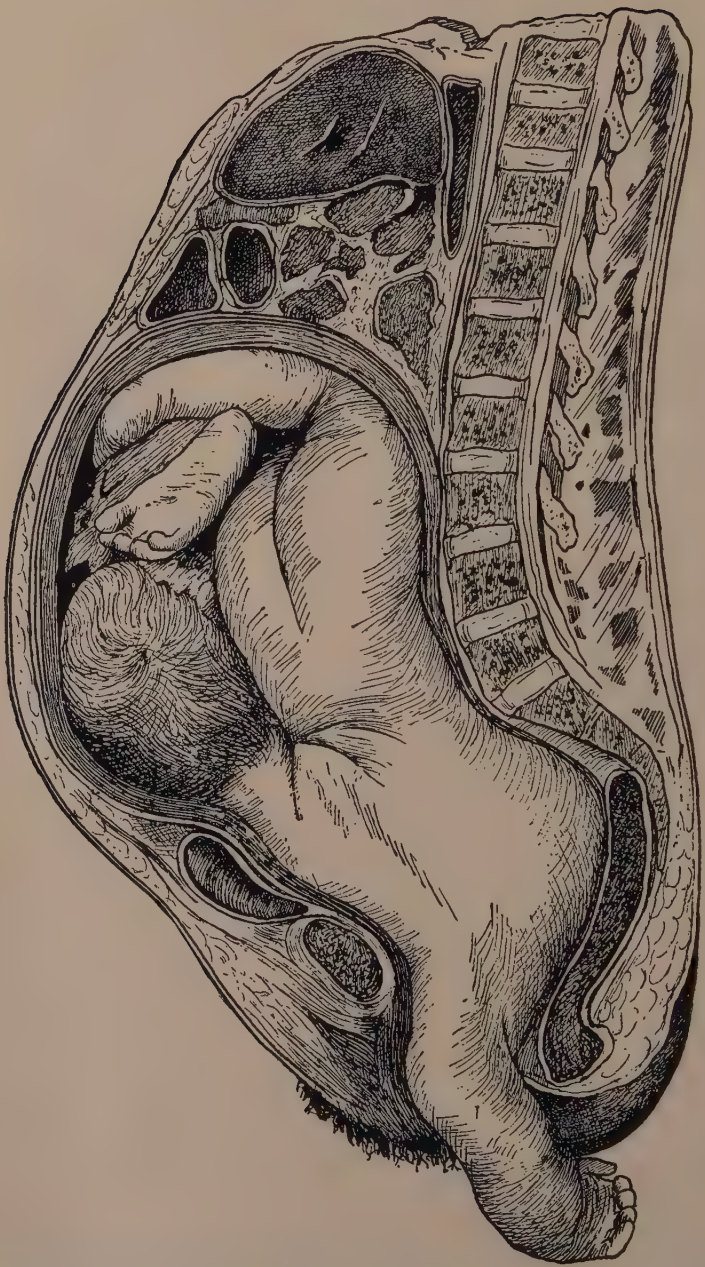

Fig. 130.—Impacted shoulder presentation with prolapse of the arm (Chiara).

manipulations by an assistant, who stands at the patient's side and endeavors to control the descent of the head.

Should this effort fail, the operator may then try to cause the descent of the breech and the ascent of the head into the uterine cavity. The shoulder is then lifted directly upward and to one side

Fig. 131.—Rupture of the uterus in its most usual location, showing the contraction-ring and Bandl's groove or depression very strongly marked (Nagel).

of the promontory of the sacrum, the head is carried gently upward into the uterine cavity, and the breech thus allowed to drop downward into the pelvis.

The danger of uterine rupture must always be kept in mind in these manipulations. Should success not be immediately obtained under gentle manipulation, the operator should desist and perform embryotomy in the interests of the mother. The danger of uterine rupture may be estimated before operation by the tetanic condition of the uterine muscle, the presence of the contraction-ring, its distance from the pubes, the distended condition of the lower uterine segment, and the size and consistence of the fetal head. Slight fever on the part of the mother, rapid pulse, restlessness and complaint, or severe abdominal pain contraindicate combined version and call for embryotomy.

Internal Version.—This is usually termed podalic, as it is not often that the attempt is made to completely turn the fetus and bring the head to the pelvic brim by the introduction of the hand. As the name indicates, in this operation the hand is introduced within the uterus, and the fetus is dislodged sufficiently from its faulty position to permit the turning of the fetal body, so that its long axis is parallel to that of the birth-canal. In most cases version is followed by extraction, so that version and extraction are often considered as one operation, and spoken of, inaccurately, as version.

The Indications for Version.—A transverse or oblique position of the fetus, the head not engaged and inaccessible for the forceps, prolapse of the cord while the head is presenting above the pelvic brim, a second child in twin pregnancy, conditions in which prompt delivery is necessary, but as the head has not descended and engaged, the forceps cannot be used, malpositions of the fetus which render the engagement and descent of the head impossible, are the principal indications for the performance of version. In placenta prævia version is done to check hemorrhage at the sacrifice of the child's life. On the contrary, in prolapse of the cord, version is performed to save the life of the infant. The advantages of version are that it enables the physician at once to diagnosticate accurately intrauterine conditions which have caused labor to cease and it places the fetus practically under his control. With one accustomed to

operate by version, the operation can be performed with very little assistance and possibly without a trained person. It is thus the expedient of the general practitioner, should he be overtaken while alone with some serious obstetric emergency. The performance of version requires, in itself, no instruments, although extraction is

Fig. 132.—Bipolar version: Dislodging the head from the pelvic brim (Kerr).

often accompanied by laceration, and the operator should be prepared to control hemorrhage and immediately repair lacerations.

The Technic of Version.—For the successful performance of version the patient should be placed on a high table, at its edge, upon her back, the thighs thoroughly flexed upon the abdomen, the legs upon the thighs. If possible, the lower extremities should be sep-

arated by assistants, as it may be necessary to vary the position of the limbs if extraction is to follow version. If the operator is alone and must anesthetize the patient and perform version without assistance, he may place the patient on her left side at the edge of a high bed and, standing opposite her, anesthetize her with chloroform with the left hand. and, introducing the right, perform version. The

Fig. 133.—Bipolar version: Turning the child by combined manipulation (Kerr).

suggestion has been made that in cases where the presentation of the fetus was complex and difficult to adjust, above the pelvic brim, that the patient be placed, if possible, upon her abdomen, thus straightening the axis of the birth-canal and enabling the operator to draw the fetus downward easily.

The anesthetic should, preferably, be chloroform during the per-

formance of version. If extraction is not to follow, anesthesia should cease as soon as version is complete. If the operator intends to proceed to delivery, ether should take the place of chloroform. The patient should be antiseptically prepared, and a copious vaginal douche of lysol (1 per cent.) should be administered. In suspected cases a very thorough vaginal cleansing with tincture of green soap and lysol should be made, followed by copious irrigation with boiled water

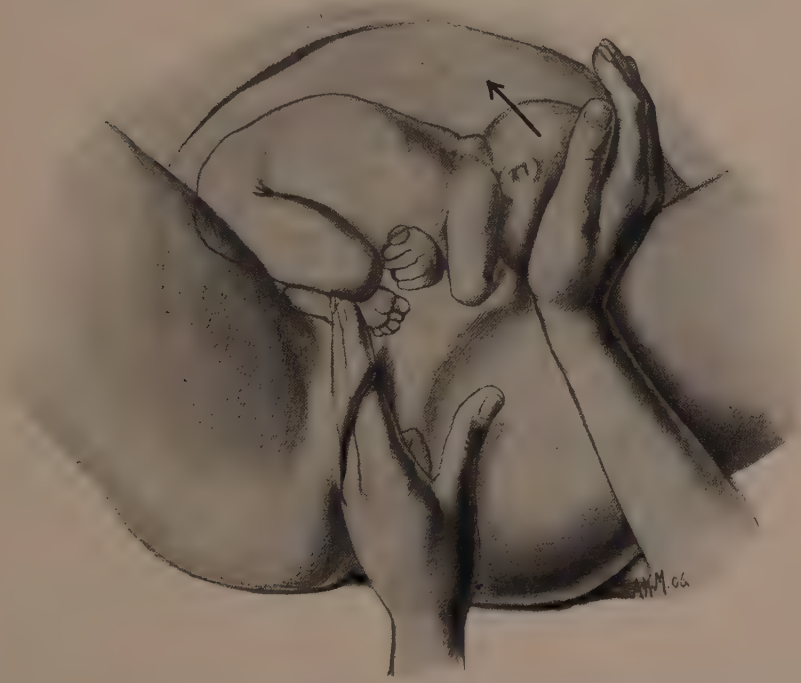

Fig. 134.—Bipolar version: Turning the child by combined manipulation; grasping the foot (Kerr).

and then bichlorid (1 : 4000). The patient should be thoroughly catheterized when completely under the anesthetic. The operator's hands and forearms above the elbow should be made aseptic and covered with sterile rubber gloves or gauntlets. The limbs and abdomen of the patient should be covered with sterile linen. The position of the fetus should be thoroughly mapped out by palpation and auscultation, and the operator should fix in his mind the probable

location of the lower extremities of the child. If, for example, the head is upon the left side of the mother, the back to the front, the right shoulder presenting, the lower extremities of the fetus will be found in the upper and right side of the mother's uterus. In complex presentations the operator should try to recognize the position of the back, and, naturally, search opposite this for the feet. That

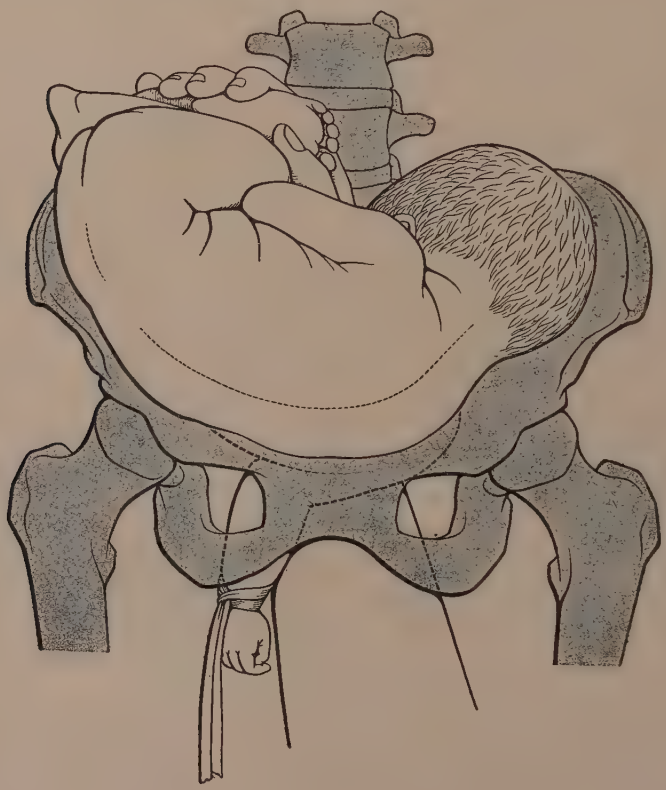

Fig. 135.—Podalic version: Grasping the feet (Farabeuf and Varnier).

hand should be inserted into the uterus which, as the operator sits before his patient, is opposite the feet of the child.

The hand should be folded into a cone and passed along the posterior wall of the vagina and pelvic floor as far back as possible, thus avoiding the fetal body, which in transverse position lies usually to the front. Reaching the sacrum, the fingers should ascend upon the

side where the feet are sought, and the effort be made to grasp the lower foot of the child. If it is necessary to proceed promptly with extraction and both feet are available, both should be taken. The foot or feet should be grasped between the fingers of the operator, the thumb being placed across them to the front to make the grasp secure. The operator should then bring the hand slowly and steadily

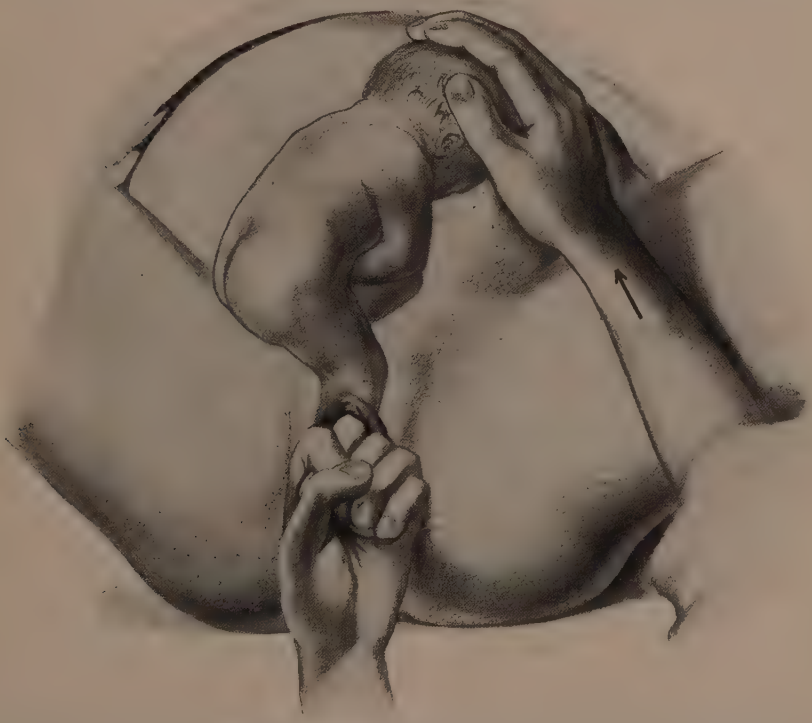

Fig. 136.—Bipolar version: Bringing down the breech and legs by traction upon the foot (Kerr).

downward in the oblique diameter of the pelvis, remembering to turn the limbs of the child so that the heels point toward the pubes. The effort of the operator should be to bring the back of the child toward the pubes from the very beginning of version. The external hand may make pressure upon the abdomen, covered with sterile linen, gently pushing the head upward in the opposite direction from that in which the hand grasping the feet is traveling. Should manipula-

tion cause vigorous uterine contractions, the operator should hold the fetus in the position obtained and wait until the contraction is

Fig. 137.—Version in breech presentation, first position; extended limbs; feet in the fundus of the uterus, bringing down the anterior and left foot with the left hand (Nagel).

past. Remembering the danger of uterine rupture if the fetal body fails to move after gentle and patient efforts, the operator may be obliged to desist, and terminate labor in some other way. When

one or both lower extremities protrude from the vulva, version may be said to have been accomplished. The operator may then determine whether to allow the child to be expelled spontaneously or to proceed with extraction. If the extraction is not to follow version, a noose of gauze bandage may be placed around the child's lower

Fig. 138.—Version and extraction; grasping the foot (Kerr).

extremities, and, if desired, a light weight may be attached to the bandage, thus making continuous but gentle traction. In placenta prævia, where version is made to stop hemorrhage, such traction should not be employed. After version the operator should not proceed to extraction, but the parts should be thoroughly cleansed and the pa-

tient given stimulants until the uterus acts spontaneously. If the child is not to be immediately delivered, its body should be wrapped in warm sterile towels with the hope of saving its life. An examination should be made to ascertain, if possible, that the cord is not pinched between the pelvis and the body of the child. If the cord is undergoing dangerous compression, it should, if possible, be

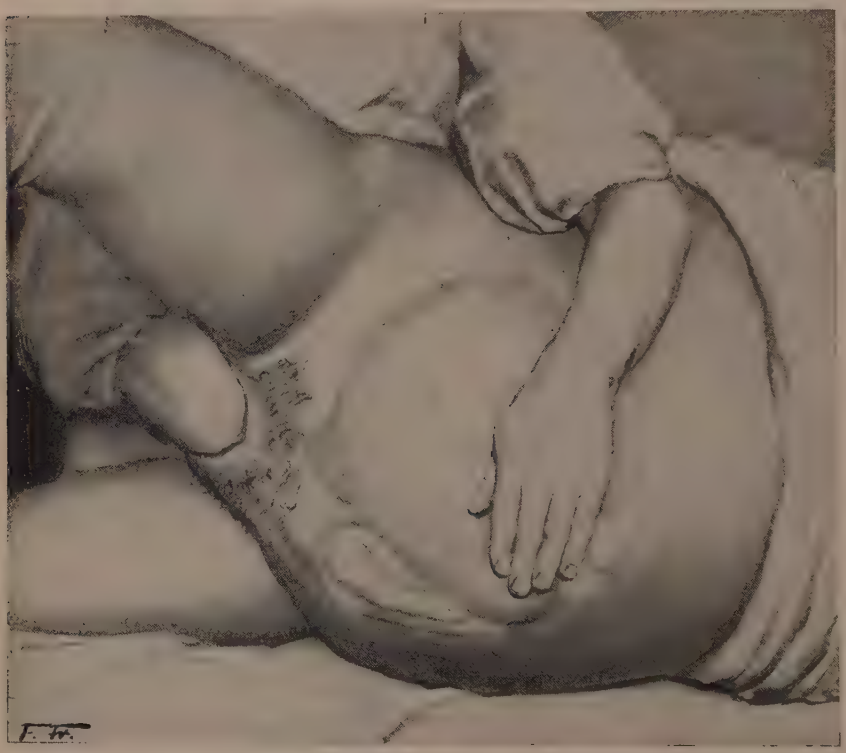

Fig. 139.—Internal podalic version, the patient lying on her left side. The right hand of the operator is passed upward to grasp the left foot of the child. The fetus is in transverse position, shoulder presentation (Nagel).

carried to the side of the promontory of the sacrum, where pressure will be less.

During version it is sometimes considered advantageous to retain a hold upon a prolapsed arm of the fetus. This may be done by passing a noose of gauze bandage around the prolapsed arm at the wrist, while the operator proceeds to turn the child.

Version After Pubiotomy and Section Through the Lower Uterine Segment.—Version and extraction after pubiotomy should be avoided. It is practically impossible to perform version and extraction without making pressure with the fetal head against the cut ends of the pubic bone; and such pressure must result in lacerations which would, in many cases, open into the pelvic or peritoneal tissues. After vaginal

Fig. 140.—Internal podalic version. The operator has grasped the foot, and is bringing down the left and lower leg of the child (Nagel).

Cesarean section or suprasymphyseal section through the lower uterine segment, version and extraction should be avoided if possible, because of the danger that turning may tear the lower uterine segment and wound the peritoneum.

The Results of Version.—In contracted pelves, before Cesarean section and pubiotomy were commonly employed, version was advised and frequently practised. In many Continental clinics 10

per cent. of cases of contracted pelves were delivered by version and extraction. This operation was followed by a considerable maternal mortality. In 22 cases Scheffzek[1] lost 2 mothers; 3 mothers suffered from complications during recovery. His mortality rate for the children was 59.6 per cent. Hannes gives a fetal mortality of 34.5

Fig. 141.—Internal version with the patient lying upon her right side, the operator introducing his left hand into the uterus, and with the thumb pushing the head of the child aside; while the fingers are carried upward to reach the feet. The left hand presses the breech down through the abdominal wall and uterus (Nagel).

per cent.; Peham, of 60 per cent. Such results in the hands of experienced operators have caused, in great measure, the abandonment of version in contracted pelves. Pollock[2] has sought to lessen the diffi-

[1] Archiv f. Gyn., Band 88, Heft 3, 1909.
[2] Trans. of the Obstetrical Society of London, vol. 4, 1906.

culty of version by placing the patient in the Trendelenburg posture.

While version and extraction are followed by considerable mortality in contracted pelves, in normal pelves the maternal mortality is but slightly greater than that of the use of forceps. The fetal mortality of version and extraction must always be con-

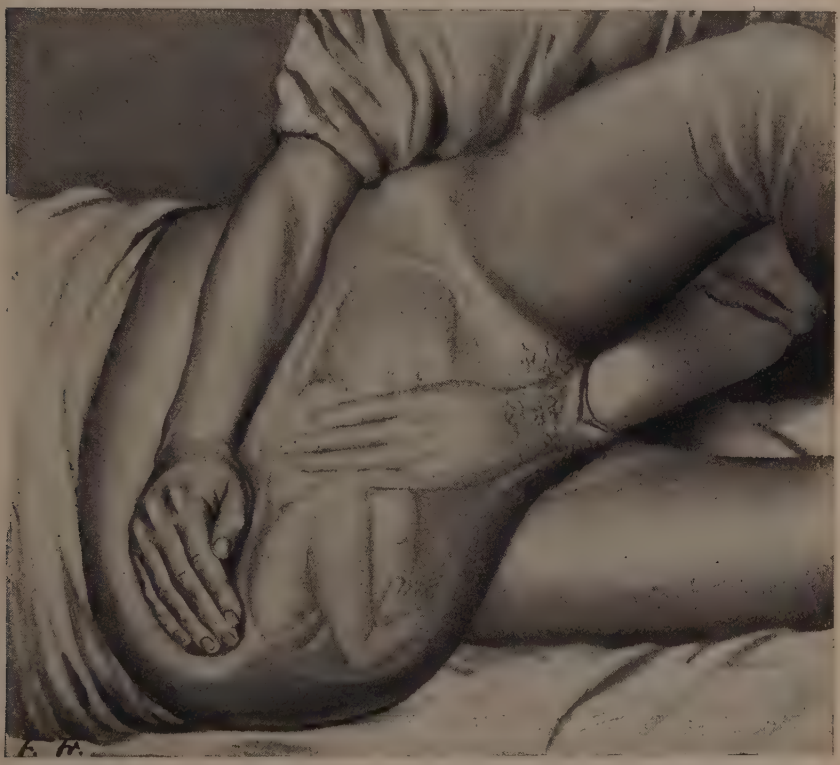

Fig. 142.—Internal podalic version. The patient upon her right side; the left hand of the operator is passed over the breast of the child, pushing up the head and shoulders so that the breech may descend. The right hand of the operator assists by manipulating the uterus through the abdominal wall (Nagel).

siderable, independent of the size of the pelvis. The manipulation necessary to turn the child favors the entrance of air into the uterus, and may be followed by air embolism, as in a case reported by Apfelstedt.[1] The patient, a multipara with normal pelvis, had

[1] Zentralblatt f. Gyn., No. 23, 1907.

face presentation and spontaneous labor ceased. After incisions into the cervix, hemorrhage and collapse occurred. The placenta was found low in the uterus and version was immediately done. The patient steadily collapsed and died with symptoms of air embolism.

Fig. 143.—Internal podalic version, as in the preceding. The breech has been brought sufficiently far down for the operator to grasp the upper right foot (Nagel).

Version may also cause the detachment, partial or complete, of the placenta, while the danger of uterine rupture can never be forgotten. So far as the fetus is concerned, difficult version may cause fracture of the humerus in the endeavor to dislodge the arms from a vicious position, fracture of the thigh in endeavoring to bring down the lower extremities, partial dislocation of the joints of the lower

extremities, injury to the umbilical cord, injury to the child's face and head, and, where extraction follows with difficulty, fracture of the cranium with intracranial bleeding. The results of version clearly indicate that it is an operation in the interests of the mother, and that only in prolapse of the cord, with the conditions favorable for easy extraction, can it be considered an operation undertaken in the

Fig. 144.—Internal podalic version, as in the preceding, grasping the right anterior foot with the left hand of the operator (Nagel).

interests of the child. The liability of septic infection during version is considerable, as the hand is introduced within the womb, and while, theoretically, it is within the membranes, there is abundant opportunity for infection during the passage of the hand through the cervix.

Spontaneous Version.—It has been observed in some cases that although the child was transverse at the pelvic brim, the shoulder

impacted, and the fetus apparently immobile, after some time the child would be spontaneously expelled, the breech or head presenting. This is most apt to happen if the child be dead or macer-

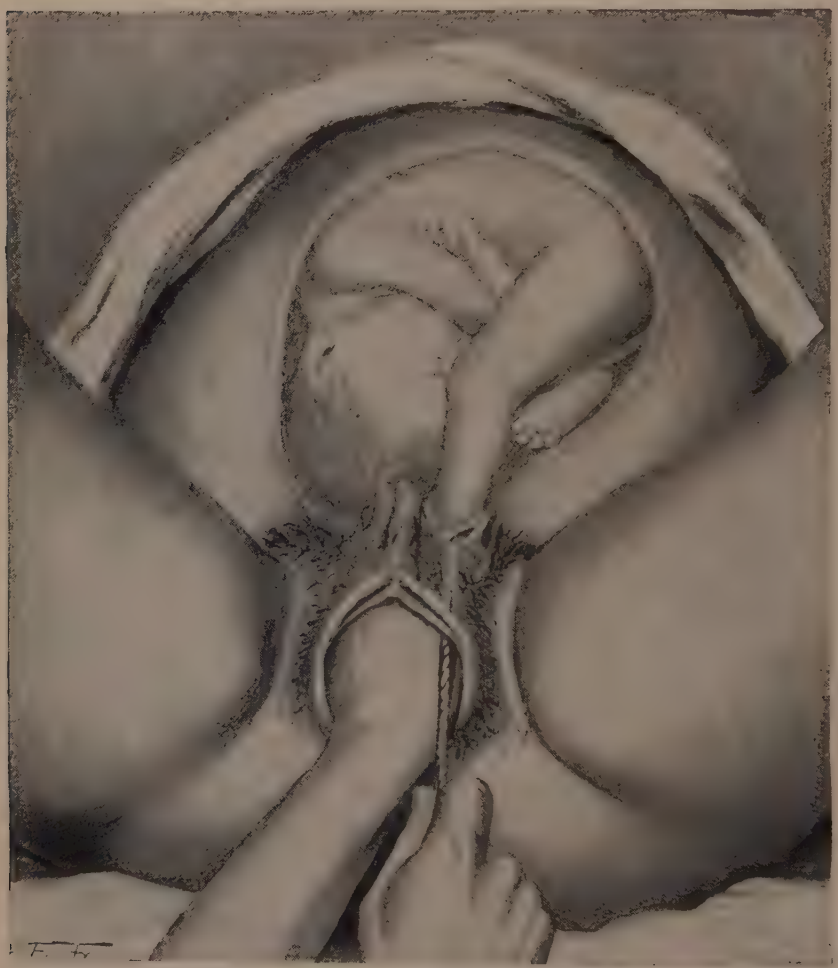

Fig. 145.—Bringing down the breech by combined manipulation, a sling being attached to one ankle, the operator making traction upon the sling with one hand, and pushing the head up with the other (Nagel).

ated or if it be of unusually small size. This is much accelerated if the patient maintains a squatting posture. King[1] draws

[1] Surgery, Gynecology, and Obstetrics, August, 1908.

attention to this fact, and advises the placing of such patients in a squatting posture, the thigh opposite the fetal head considerably advanced in front of the other; if the patient leans forward, steadying the body by grasping the side of the bed or a chair, the axis of the

Fig. 146.—Podalic version complete, with the bringing down of the left foot (Nagel).

pelvis is favorably directed, the abdominal muscles are stimulated to contraction, and spontaneous version may be hoped for. The writer can confirm King's observation, as he has several times seen spontaneous version follow this maneuver.

Dilation of the Cervix in Version.—In many cases it is necessary to perform version before the cervix is completely dilated. Unless the indications are most pressing, the operator should precede version by manual dilation. In the face of threatened hemorrhage he may introduce the hand as hastily as possible. The undilated condition of the cervix should warn the operator not to perform rapid extraction, especially in cases where the child is dead, exhausted from hemorrhage, or has been badly injured. If it is hoped to save the child, then the mother's cervix may be torn to permit the exit of the child, and immediately repaired after delivery. The use of dilating bags is rarely advantageous before version, as their action is too slow for dangerous cases, and the operator usually prefers to perform dilation with the hand. Multiple incisions in the cervix preceding version may be used in cases where the cervical tissue is unusually dense and resisting.

The Prognosis of Version and Extraction.—In dealing with patients and their friends, the operator should be careful to warn the friends of the mother that if extraction must be performed the chances of the child are not so good as those in normal labor or with the use of forceps. In cases where version is done without extraction, the necessity for sacrificing the child in the interests of the mother should be explained. Version is sometimes necessary in the case of fetal monstrosities, where an exact diagnosis of the fetal condition is impossible without the introduction of the hand. If an abdominal tumor be found complicating the delivery of the fetus, goiter, or some intracranial condition, the operator must prepare to perform embryotomy in addition to version and extraction. In dealing with monstrosities and macerated children the operator should take care not to leave the severed head within the uterus. It is better after version not to perform extraction in a case of dead and macerated fetus until a secure grasp of the skull has been obtained. If necessary, a decapitation hook may be introduced into the fetal mouth.

Bibliography

Apfelstedt: Zentralblatt f. Gynäkologie, No. 23, 1907.
Bröse: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 51, Heft 3, 1904; Zentralblatt f. Gynäkologie, No. 12, 1904.
Bürger: Monograph, Management of Labor in Contracted Pelvis, Wien, 1908.
Chwiliwicky: Zentralblatt f. Gynäkologie, No. 11, 1907.
Groeschel: Zentralblatt f. Gynäkologie, No. 46, 1907.
Hannes: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 62, Heft 2, 1908.
Ingerslev: Journal of Obstetrics and Gynecology of the British Empire, January and February, 1909.
King: Surgery, Gynecology, and Obstetrics, August, 1908.
Kraus: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 56, Heft 1 and 3, 1905.
Krull: Archiv f. Gynäkologie, Band 67, Heft 2, 1902.
Ladner: Zentralblatt f. Gynäkologie, No. 47, 1907.
Leisewitz: Archiv f. Gynäkologie, Band 86, Heft 1, 1908.
Lichtenstein: Archiv f. Gynäkologie, Band 81, Heft 3, 1907.
Longus: Münchener med. Wochens., No. 11, 1907.
Miller: Münchener med. Wochens., p. 323, 1907.
Muyer: Inaug.-Diss., Rostock, 1907.
Nijhoff: Zentralblatt f. Gynäkologie, No. 25, 1907.
Peham: Monograph, Wien, Alfred Holder, 1908.
Pfannenstiel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 24, Heft 4, 1906
Pollock: Transactions, Obstetrical Society of London, vol. 4, 1906.
Rieck: Zentralblatt f. Gynäkologie, No. 28, 1909.
Schultze: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, Heft 2, 1909.
Schulz: Inaug.-Diss., Breslau, 1905.
Schwarzmeyer: Münchener med. Wochens., p. 801, 1907.
Veit: Zentralblatt f. Gynäkologie, No. 23, 1907.

EMBRYOTOMY

By embryotomy we understand the lessening of the fetus in size to permit its delivery through the body of the mother. This is undertaken without regard to the life of the child, and so embryotomy is a child-destroying procedure. Probably the oldest of all obstetric operations, embryotomy has been largely superseded, in the case of

living children, by Cesarean section and pubiotomy. The induction of labor endeavors to avoid embryotomy.

The Indications for Embryotomy.—Embryotomy is indicated in cases where, by reason of pelvic deformity, excessive fetal size, or malformation, a dead or dying fetus cannot be delivered through the body of the mother without serious injury to her. If the fetus has

Fig. 147.—Labor complicated by hydrocephalus (Bumm).

been subjected to repeated attempts at delivery and to long-continued and vigorous birth pressure, its life should not be considered in the same light with the life of a vigorous fetus before the beginning of labor. The presence of a monstrosity in the womb justifies embryotomy. The presence of a syphilitic fetus in the womb would not justify embryotomy, for the newborn child may be treated for

syphilis with a fair chance of success. In brief, when the fetus shares with the mother some condition which renders its life very doubtful, or when it has been exposed to ineffectual efforts at delivery and long-continued birth pressure, and conditions are present which, in the interests of the mother, make delivery imperative, embryotomy may be performed without hesitation.

Fig. 148.—Impacted twins (Bumm).

In the present enthusiasm for Cesarean section and pubiotomy, cases are sometimes subjected to Cesarean section which should be treated by embryotomy. As an example, a general practitioner was requested by a family to attempt forceps delivery in a primipara with contracted pelvis. He made the attempt in a private house and failed. The patient was then transferred to a hospital and, al-

though the patient had been some time in labor and the child subjected to birth pressure and to forceps pressure, Cesarean section was performed. The child died of birth pressure shortly after delivery and the mother died of septic peritonitis. It must be remembered that ineffectual attempts at forceps delivery cannot be made without exposing the mother to grave danger of infection and the child to grave danger of intracranial injury; hence, such cases are not proper for Cesarean section unless the operator is prepared, recognizing them as infected, to remove the body of the womb after delivering the child, or to drain the body of the womb by suprasymphyseal extraperitoneal section. In the case described, embryotomy should have been done, the uterus packed and drained, with a reasonable chance of saving the mother's life.

General Considerations Concerning Embryotomy.—As embryotomy is a disastrous termination of labor, the operator should pay all deference to the feelings and beliefs of the patient and her family. If the parents and relatives cherish the belief that baptism is essential for salvation, it may comfort them if the rite of baptism is administered to the fetus as soon as a portion of its body protrudes from the mother. If the services of a priest cannot be conveniently obtained, a friend should be asked to perform this office. To spare the mother sorrow, care should be taken not to expose the mutilated body of the child to the observation of friends and neighbors. If a monstrosity or a deformity exists, it should be pointed out to the husband or some responsible relative, thus justifying the performance of embryotomy. Instruments and appliances for embryotomy should not be exposed, and the operation should be done without the presence in the room of relatives other than the husband of the patient if he requests to be present at the operation. Care should be taken, if possible, to avoid exaggerated accounts of the operation from being given to the mother and her friends.

Craniotomy.—As the head most frequently presents, so that portion of the fetus most frequently lessened in size in embryotomy has given the name most commonly applied to the operation.

Craniotomy consists in opening the fetal cranium. This simple operation was probably the first in obstetric surgery, and was performed in cases where spontaneous labor failed, the head could not be extracted with the hands, and was pulled out often piecemeal by the sharp hook. At present craniotomy may be performed by

Fig. 149.—The perforator, having been carried up the vagina under protection of the fingers of the operator's left hand, is being pushed into the skull in the neighborhood of the anterior fontanel (Kerr).

simply perforating the cranium, and allowing the expulsive forces of labor to lessen the size of the cranium by forcing out its contents. This operation may be done by any piercing instrument which will penetrate the cranial bones. Sharp-pointed scissors are most frequently employed. Smelley's scissors have cutting edges to the outer

aspects of the blades, and when the blades are separated cut through bony tissues. In performing craniotomy with scissors, a parietal bone is most often opened, as this is most available in the pelvic cavity.

Fig. 150.—The blades are being separated by pressing together the handles (Kerr).

Simply perforating the cranium is rarely satisfactory, because it lessens so little the size of the fetal head that the bony flaps close with intracranial pressure, and but little is effected by the operation. Accordingly, the effort has been made to make a permanent opening in the cranium by the use of the trephine. The long trephine devised

by Martin is that usually employed. In applying this instrument care must be taken that it is brought firmly against the cranial bone, and that it does not slip when pressure is made. If the scalp is very edematous and thick, it should be incised, allowing the operator to place the trephine firmly against the bone. An assistant should steady the head by suprapubic pressure while the trephine

Fig. 151.

Fig. 152.

Figs. 151 and 152.—Auvard's three-bladed cranioclast and its use (Bumm).

is perforating. Although the parietal bone is the site of choice for trephining, still, in necessity, any portion of the fetal head available may be utilized. The trephine should remove a complete button of bone, leaving a permanent opening which will not close on pressure.

Cranioclasis.—After trephining, the size of the head remains practically the same. To secure its diminution an instrument should be

passed through the trephine opening, and the membranes and brain thoroughly torn. The cranium should then be washed out with an antiseptic fluid injected by a piston syringe; if such is not available, a copious irrigation of the cranial cavity with a fountain syringe should be employed. The operator then passes through the trephine opening the cranioclast, of which Braun's is the type usually employed. This instrument contains two blades, one serrated for

Fig. 153.—The head extracted by the cranioclast (Bumm).

a firmer grasp and the other fitting smoothly over it. It has a pelvic curve and a fixation screw. The serrated blade is passed within the cranium, the other externally, and the two are firmly clamped as near the base of the cranium as possible. If the cranioclast is applied to a parietal bone only, and strong traction is made, the bone will be torn free from its attachment, leaving the balance of the head. When the cranioclast has been securely applied, traction should be

made downward and backward in the axis of the birth-canal and the head cautiously delivered over the pelvic floor. The contents of the cranium are frequently forced out through the trephine opening during the extraction of the head. The head emerges with the cra-

Fig. 154.—Perforation and application of the three-bladed cephalotribe through the mouth in a case of face presentation (Kerr.)

nioclast at the apex, more or less drawn out, in proportion to the difficulty of the extraction.

Cephalotripsy.—In delivery by the cranioclast the size of the head is lessened by the pressure of the pelvic walls. If the head be unduly ossified, such pressure may be ineffectual in reducing the head sufficiently to permit its safe extraction. The base of the

cranium may be so resisting as to form a serious obstacle to delivery. In these cases it is necessary to crush the head. This is accomlished by the cephalotribe, a pair of strong forceps with a compression screw at the outer extremities of the handles. This instrument is applied along the sides of the pelvis, compression made, the instru-

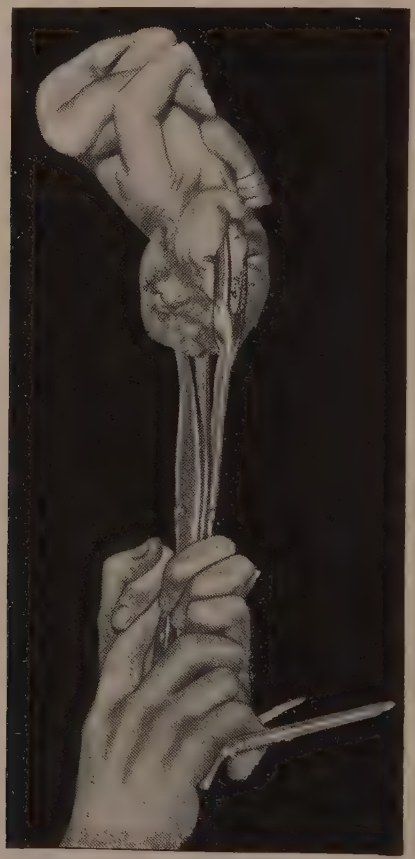

Fig. 155.—Showing ideal grasp of head with the three-bladed cephalotribe: one blade well down over face and the other over occiput (Kerr).

ment relaxed, and then again applied until the head is thoroughly crushed. It can then be delivered in the grasp of the cephalotribe. The dangers of cephalotripsy lie in the fact that the broken cranial bones may protrude through the scalp and wound the mother during delivery.

Basiotripsy.—Tarnier and others have devised instruments combining the perforator and the cephalotribe. These instruments con-

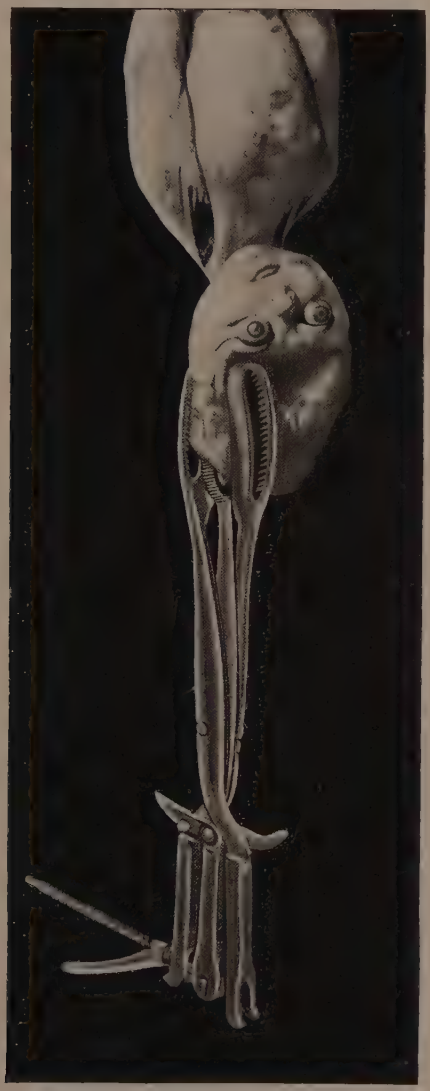

Fig. 156.—Showing the effect of crushing only one-half of the head in cases of posterior parietal presentation (Kerr).

sist of a central stem having at its extremity a firm screw like an augur, which can be carried through the cranium and fastened into

the bones at the base of the skull. On each side of this are the blades of the cephalotribe, which can be applied, crushing the head. The head thus crushed and perforated is delivered in the grasp of the instrument.

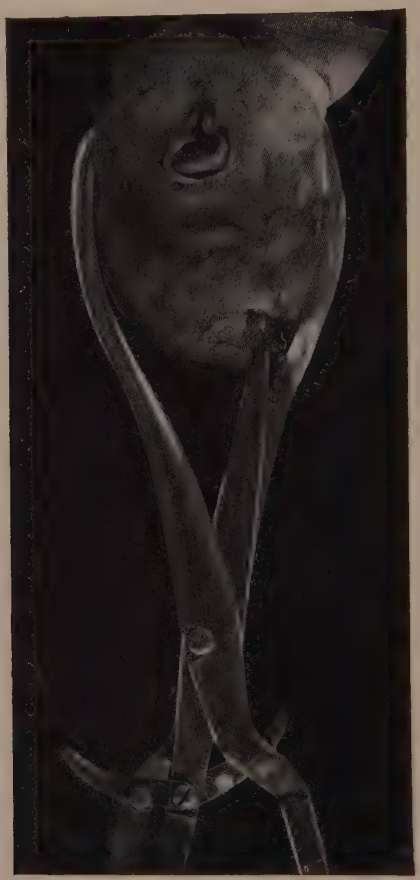

Fig. 157.—Showing the perforation through the posterior fontanel in case of extreme flexion of the head. It will be observed that the blade placed over the face does not reach further than the forehead (Kerr).

Unusual Forms of Craniotomy.—It may be necessary to perform craniotomy on the after-coming head, when the cranium may be entered through the foramen magnum or, in rarer cases, through the mouth of the child. In impacted face presentation it may be necessary to open the head through the face in any manner least

apt to wound the mother. In brow presentation the face is the available area for craniotomy. In these cases especial care must be taken to avoid the slipping of the instruments employed, and to introduce them sufficiently deeply into the cranium to obtain a firm hold.

Fig. 158.—Showing the cranioclast slipping because the anterior blade is not applied far enough down over the face (Kerr).

Cleidotomy.—By cleidotomy is understood the severing of one or both clavicles to lessen the size of the fetal shoulders, thus reducing the bisacromial diameter. The operation may be performed upon the living or dead fetus, and is indicated for excessive development of the shoulders, preventing their birth after the expulsion of the head. Blunt-pointed scissors upon a long handle are required, and under the usual precautions the fingers are inserted and the clavicle located. The scissors are then passed along the internal fingers, and

with a sawing motion the clavicle is cut through. Usually the most available portion of the bone is severed, but if a choice can be made, it should be as near the trunk of the body as possible. As the result of this the bisacromial diameter is considerably lessened and delivery often rendered possible.

Fig. 159.—Perforating the after-coming head through the posterolateral fontanel (Kerr).

The clavicle may be broken in difficult breech extraction in bringing down the arms, thus permitting the birth of the child. In some cases the operator may deliberately risk this accident with the hope of securing a living fetus.

Evisceration.—It may be necessary to open the thorax or abdomen of the child for accumulation of fluid, solid tumors, or diseased conditions of the viscera. Such operation might be termed eviscera-

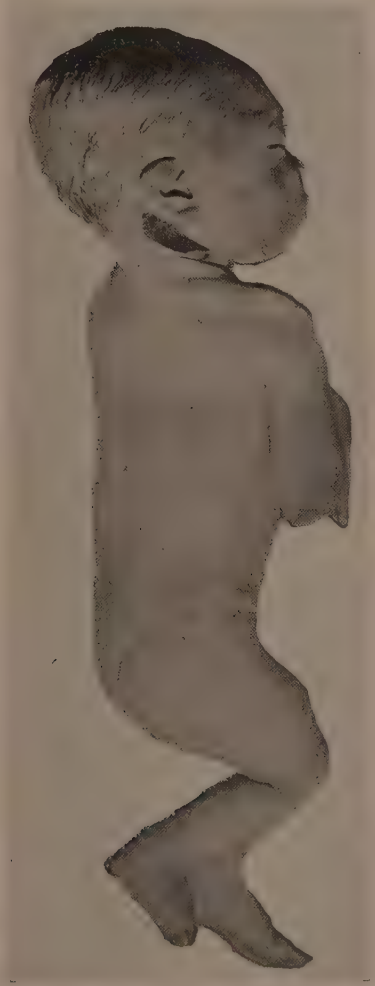

Fig. 160.—Wound in the fetus produced by cleidotomy.

tion. For this purpose blunt-pointed scissors should be used, the operator having carefully mapped out the position of the child and being sure that he does not mistake maternal for fetal tissue. The fetus *in utero* has had ovarian cyst preventing labor, accumulations

in the abdomen greatly altering its size, and accumulations of fluid in the chest as well.

In hydrocephalus, the breech presenting and the head retained within the uterus, it may be necessary to open the spinal canal with

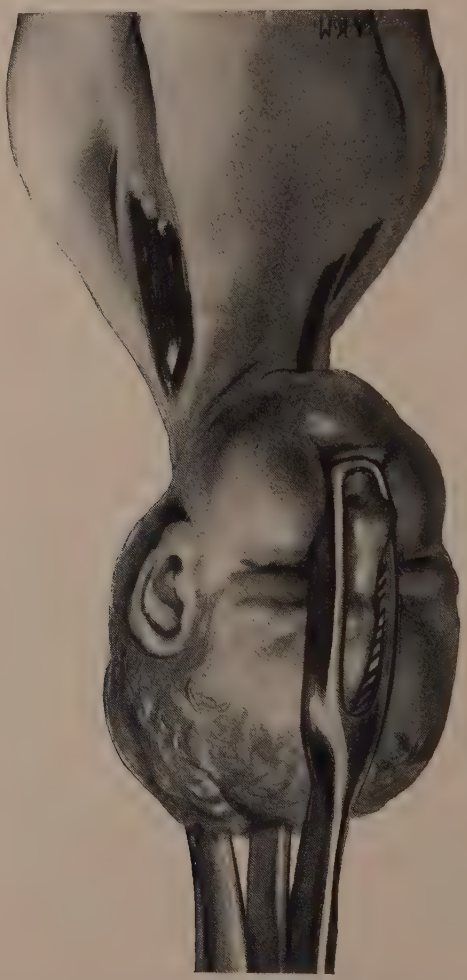

Fig. 161.—Showing the collapsed shoulder-girdle after cleidotomy. The child was a very large one and had to be extracted with the cephalotribe (Kerr).

the hope of securing drainage and permitting the delivery of the head. The effort has been made to save the life of the fetus in these cases by removing a portion of the intracranial fluid. This effort

has rarely been successful, and should not be made with confidence. A trocar and canula have usually been employed in the spinal canal, in the lower dorsal or upper lumbar region.

Decapitation and Amputation.—In impacted shoulder presentation with threatened uterine rupture, amputation of the prolapsed upper extremity may become necessary. This decomposes the wedge formed by the fetal shoulder and enables the operator to do version or to reach the neck of the child more safely for decapitation. Blunt-pointed scissors is the safest instrument for this operation, and

Fig. 162.

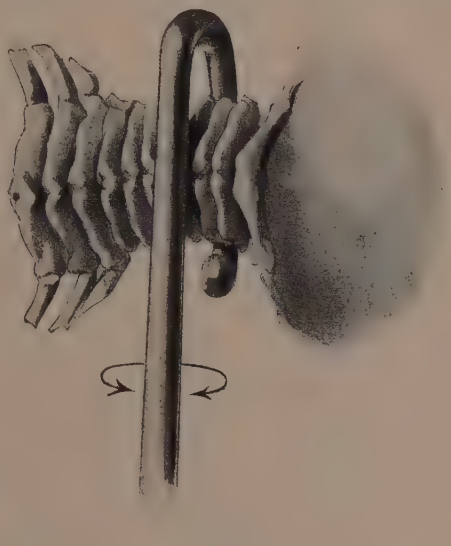

Fig. 163.

Figs. 162 and 163.—Braun's blunt hook and its use in decapitation (Bumm).

strong traction should be made downward upon the prolapsed arm by an assistant during the amputation. The operator should remove as much from the shoulder as he can without risk of wounding the mother.

To perform decapitation, Braun's decapitation hook has proved practical, simple, and as safe as any instrument of the sort. More elaborate instruments, carrying cutting blades, are not easily sterilized, often fail to work, and may wound the mother. The introduction of the hook may be aided by traction upon the prolapsed arm

made by an assistant. Guided by the fingers of one hand, the hook is passed over the neck and brought firmly into its tissues, then, in a rotary motion from side to side, the hook is brought slowly but firmly down until the spinal column is felt to separate, it is then brought out through the skin, or the skin may be incised with blunt-pointed scissors. The severed head is then pushed upward into the uterus and the body of the child delivered as is most convenient. This can sometimes be effected by traction upon the prolapsed arm, if it has not been necessary to do amputation. If delivery is very difficult, it will be necessary to deliver the child by the feet and breech. The severed head may be brought by pressure to the brim of the pelvis, and usually delivered by forceps. If this is not possible, it should be extracted by craniotomy.

In the lack of suitable instruments, decapitation has been performed by passing a stout cord, dipped in vinegar, around the fetal neck, and gradually sawing through the spinal column.

The Delivery of the Fetus Piecemeal.—In desperate cases it may be necessary to remove the fetus little by little. In these cases labor has long been neglected, the birth-canal is so swollen that the operator can reach the fetus with great difficulty, and a typical operation is impossible. By the use of blunt-pointed scissors and long forceps with serrated blades a fetus can be removed in this manner. The operation is difficult and often dangerous and would never be done from choice.

The Frequency and Results of Embryotomy.—Embryotomy is most often performed in contracted pelves, and as Cesarean section and pubiotomy have become perfected, embryotomy is much less frequent. Scheffzek, in 1011 cases of contracted pelves, performed perforation 43 times (4.2 per cent.). Most of these cases were craniotomy. Peham estimates the frequency of embryotomy as 6.32 per cent.; Hannes, 5.1 per cent.; Baisch, 2.9 per cent.[1] In Scheffzek's cases the child was living at the time of operation. In general, from the reports of various clinics, it may be stated that at the present time perfora-

[1] Archiv f. Gyn., Band 88, Heft 3, 1909.

tion is performed on the living child in not more than 2 per cent. of cases of contracted pelves. This may well illustrate the advance of obstetric surgery from the early days, when all cases in which spontaneous labor failed were terminated by perforation and extraction. The maternal mortality of embryotomy is estimated at its lowest at between 1 and 2 per cent., and at its highest at from 4 to 7 per cent. Like the use of the obstetric forceps, in skilful hands the operation has little maternal mortality in selected cases; but so many cases of embryotomy have been neglected during labor and come under observation when infected, that the mortality in these cases must remain high, although it may not be directly ascribable to the operation.

In 1500 cases of labor in the service of the Lying-in Hospital of New York, Gushee reports 122 craniotomies.[1] In 77 cases the fetus was dead before the operation; there were 11 cases of hydrocephalus, making a total of 88 operations performed from necessity. In 12 cases a premature child was firmly held in an undilated cervix. Of these patients 56 were sent to the hospital by physicians and midwives, and among these there were 11 deaths: 6 from shock and hemorrhage, 3 from eclampsia, and 2 from septic infection. Among the cases treated in the out-patient department, 2 died from sepsis. In the 122 cases, 53 had contracted pelves, 29 were threatened with uterine rupture from distention of the lower segment, and among these were 12 cases of premature labor.

In the Dresden Clinic, Meissner[2] reports 57 craniotomies upon the living and 112 upon the dead fetus in 29,725 labors, during a period of fourteen and a half years. The relative frequency was, in 21,023 cases of labor, 49 embryotomies upon the living child and 8 upon the dead. In the operation done upon the living child the pelvis was contracted in 49 cases, normal in 8. These patients presented various complications—eclampsia, nephritis, septic infection, hematoma, and exhaustion. In some the fetus was a monstrosity, and in 3 the pelvis was highly deformed, with the mother in

[1] Bulletin of Lying-In Hospital of New York, June, 1907.
[2] Archiv f. Gyn., Band 81, Heft 3, 1907.

such a condition as to prevent section. In 8 some operation had been attempted outside the hospital; 3 mothers had serious disease, making section impossible, and 10 patients were considered infected in previous attempts at delivery. The maternal morbidity was 44 per cent. Two mothers died, 1 from eclampsia, and 1 from rupture of the uterus.

In the 122 cases where the child was already dead, the pelvis was contracted in 95.5 per cent. Among these mothers 7 died, 3 from eclampsia, 1 from caries of the vertebræ, 1 under anesthesia, 1 from nephritis, and 1 with streptococcus infection. The maternal mortality in cases where the child was dead or dying was 1.2 per cent.

Bibliography

Bretschneider: Archiv f. Gynäkologie, Band 63, Hefts 1 and 2, 1901.
Bürger: Monograph, Management of Labor in Contracted Pelvis, Wien, 1908.
D'Erchia: Annali di Ostetricia, Nos. 7 and 8, 1902.
Döderlein: Münchener m. Wochenschrift, No. 32, 1909.
Gushee: Bulletin of Lying-in Hospital, New York, June, 1907.
Hammerschlag: Zentralblatt f. Gynäkologie, No. 31, 1907.
Hannes: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 62, Heft 2, 1908.
Hegar: Beiträge z. f. Geburtshülfe und Gynäkologie, Band 11, 1907.
Hofmeier: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 59, 1907, and Band 48, Heft 2, 1903.
Jolly: Zentralblatt f. Gynäkologie, No. 51, 1908.
Katz: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 21, Heft 4, 1905.
Küstner: Zentralblatt f. Gynäkologie, No. 42, 1909.
Latzka: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 14, Heft 6, 1901.
Leisewitz: Archiv f. Gynäkologie, Band 86, Heft 1, 1908.
Lierenberger: Zentralblatt f. Gynäkologie, No. 48, 1902.
Meissner: Archiv f. Gynäkologie, Band 81, Heft 3, 1907.
Menge: Münchener med. Wochens., Band 54, p. 1465, 1907.
Peham: Monograph, Wien, Alfred Holder, 1908.
Pendl: Zentralblatt f. Gynäkologie, No. 40, 1905.
Perniche: Zentralblatt f. Gynäkologie, No. 35, 1900.
Pfannenstiel: Verhandl. d. deutschen Ges. f. Gyn., 12, Kongress, p. 351, 1907.

Radbruch: Geburtshülfe, Jena, Fischer, 1907.
Schulte: Inaug.-Diss., Giessen, 1905.
Seeligmann: Zentralblatt f. Gynäkologie, No. 3, 1905; Münchener med. Wochens., Band 54, p. 695, 1907.
Veit: Berliner klin. Wochens., p. 149, 1907.
Voorhees: American Journal of Obstetrics, December, 1902.
Zechel: Inaug.-Diss., Göttingen, 1906.
Zweifel: Zentralblatt f. Gynäkologie, No. 12, 1905.

Vaginal Extraction Preceded by Enlargement of the Birth-canal

POSTURAL ENLARGEMENT

The increased mobility of the pelvic joints during pregnancy is accompanied by mobility in various portions of the pelvis. The symphysis pubis may become so mobile that the patient experiences great inconvenience in walking, with considerable pain. Pain in the sacro-iliac joints during pregnancy must be ascribed to mobility in this region. The sacrococcygeal joint may become painful also from increased motion. The younger the patient the greater the mobility of the pelvis. The older the patient the less will the pelvis enlarge by this means.

The pelvis may be enlarged during labor through the pressure of the fetus and also from weight applied through various postures which the patient may assume. When unassisted, women frequently kneel at the side of a bed, resting the head and shoulders upon the edge of the bed; others lean forward, grasping a chair, the instinctive desire seems to be to bend the trunk of the body forward and flex the lower extremities upon the trunk, in many cases rotating the thighs outward. Mercurio and Walcher have shown that the two halves of the pelvis may be caused to rotate outward at the sacro-iliac joints by utilizing the weight of the lower extremities. This may be accomplished by placing the patient, with her sacrum raised, upon the edge of a firm and padded table, sufficiently high to permit the lower extremities to swing freely above the floor. The extremities are then

rotated outward, when it will be found that the anteroposterior diameter of the pelvis has been appreciably increased, and that there

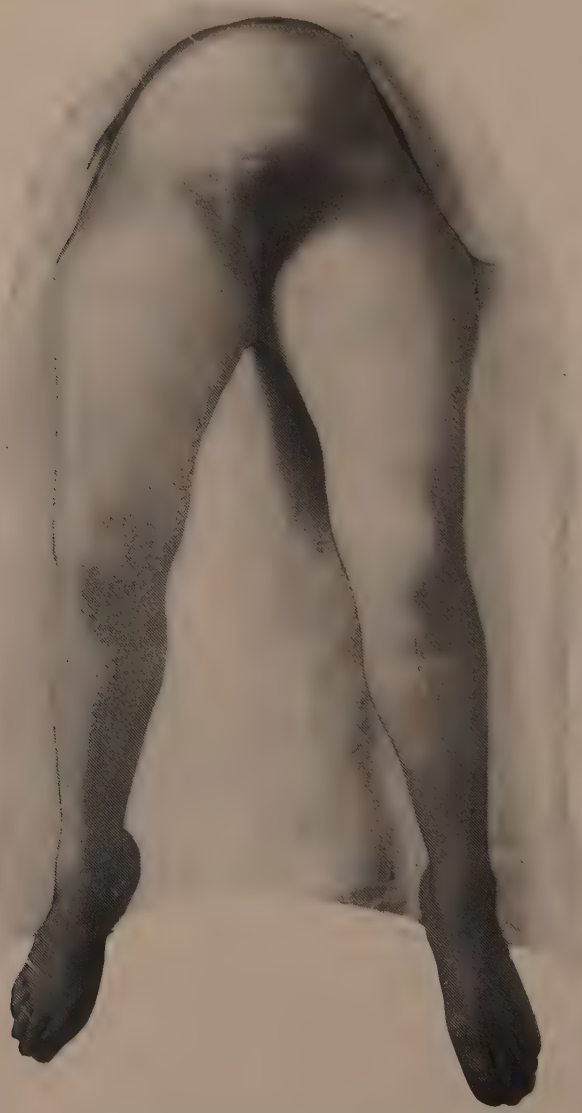

Fig. 164.—The Walcher position (Kerr).

has also been some gain in the oblique diameters. The pelvic floor is not relaxed by this procedure, and hence, at the moment of deliv-

ery, the thighs should be flexed upon the abdomen of the mother to secure the relaxation of muscular tissue. The muscles at the brim of the pelvis are also not relaxed by Walcher's position, unless the table be so arranged that the trunk of the mother's body is raised somewhat from the shoulders down. While the gain by this posture is not great, it is often sufficient to permit the passage through the pelvic brim of the fetal head. This posture is also favorable for traction downward and backward by the forceps, and this fact may account for some of the benefits which accompany its use.

To utilize this posture the patient must be placed sufficiently high from the floor. The mistake is often made of allowing the patient's feet to rest partly upon the floor, which greatly lessens the efficiency of the maneuver. Unless the edge of the table be carefully padded the patient may suffer considerable pain upon recovery from the operation because of pressure upon the sacrum. Two strong assistants are required to hold the patient in position, for otherwise the weight of the lower extremities is sufficient to drag the patient from the table. These assistants should also be prepared to flex the thighs and legs when the child is passing over the pelvic floor. With the patient in Walcher's position, the tendency is for the operator to bring the fetal head strongly against the pubes and the tissues just behind it; unless especial care be taken, serious bruising and injury to the base of the bladder may result. In all deliveries in this position the operator must often assume the very inconvenient posture of sitting or kneeling upon a low chair or upon the floor, as nearly directly under the patient as possible. In this way traction may be directed backward and wounding of the bladder avoided.

Lateral and Knee-chest Postures.—In the left lateral posture, with the hips at the edge of a bed or table, the patient is favorably placed for the passage of the child through the pelvic brim and for its exit over the pelvic floor. As there is no pressure upon the perineum the pelvic floor is free to dilate, and better dilation is secured than when the patient lies upon the back. In the knee-chest posture, with the fetus impacted in the pelvic brim, the tendency will be for the fetus

to gravitate upward, and thus to assume, in the absence of uterine contractions, a more favorable position. Version may sometimes be performed with the patient in the knee-chest posture, using the force of gravity to dislodge the child.

The Squatting and Sitting Postures.—Among primitive people parturition was often accomplished in the squatting posture, the patient grasping a tree or the hands of a friend. In this way the two halves of the pelvis were rotated outward, the fetus brought into the axis of the birth-canal, and its descent aided by the force of gravity. Among Oriental races gravity was utilized by placing the

Fig. 165.—Knee-chest posture for parturient woman (Bumm).

patient in a sitting posture upon chairs or stools especially constructed to permit the exit of the child.

The Influence of Exercise Upon the Passage of the Child Into the Pelvis.—The value of exercise in the latter months of pregnancy in increasing the mobility of the pelvis and bringing the child to engage cannot be questioned. Especially is this true in slightly contracted pelves, where the engagement of the head is often greatly facilitated by work done by the patient with the trunk of the body bending forward. The writer has repeatedly seen in hospital patients the scrubbing of a floor or flight of stairs, done regularly in the last weeks

of gestation, followed by descent and the engagement of the fetus in moderately contracted pelves. This part of the household work in the hospital is, for this reason, usually assigned to such patients. The value of walking in increasing pelvic mobility and causing engagement has been recognized.

To secure pelvic mobility during pregnancy, the patient should avoid constricting clothing and exercise moderately but frequently.

Bibliography

Cramer: Monatsschrift f. Geburtshülfe und Gynäkologie, p. 525, 1900.
Gauss: Zentralblatt f. Gynäkologie, No. 28, 1907.
Kaks: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 54, Heft 2, 1905.
Kerr: Journal of Obstetrics and Gynecology of the British Empire, April, 1903.
Proceedings International Congress, Amsterdam, 1899.

SECTION OF THE PELVIS: SYMPHYSEOTOMY, PUBIOTOMY, HEBOSTEOTOMY

When pelvic mobility, increased by posture, does not permit the engagement and descent of the fetal head, recourse may be had to opening the bony girdle of the pelvis. This may be accomplished by opening the pubic joint or by severing the pubes through the bony tissue.

Symphyseotomy

At present, time and space need not be utilized in a detailed discussion upon symphyseotomy. Its successful performance in preantiseptic times, its abandonment, and revival are familiar to all obstetricians. At present there is a tendency to decry this operation for the more recent procedure of pubiotomy.

Symphyseotomy consists in opening the pubic joint. This may be done subcutaneously or by direct incision, by what is termed the open method. Usually the cartilage of the joint only is severed. In some cases, through unusual ossification or through inaccuracy on the part of the operator, a portion of the bone is cut asunder. The results of symphyseotomy are the downward and outward rotation

of the two halves of the pelvis, caused by the weight of the lower extremities. The mechanism is the same as that of pelvic enlargement with Mercurio's or Walcher's position, increased by the severing of the pelvic girdle. If the subpubic ligament be not severed in symphyseotomy, the rotation of the halves of the pelvis is less. The diameters of the pelvic brim are enlarged after symphyseotomy in varying degree. In all cases the enlargement is appreciable and of practical importance. The halves of the pubes separate during this operation sufficiently to permit the operator to place from two to four fingers between the severed bones. If the thighs be rotated outward the separation is increased, but if pressure be made upon the sides of the pelvis and the thighs rotated inward, the separation is less. The enlargement of the pelvis after symphyseotomy is immediate, so that the head descends immediately into the pelvis, unless disproportion has been very marked.

Indications for Symphyseotomy.—Symphyseotomy, if chosen in preference to pubiotomy, is indicated in cases where the disproportion between the head and the pelvis is not great, and where the cervix, pelvic floor, and vagina have been dilated by previous labor or are readily dilatable. The reason for the first limitation lies in the fact that sufficient is not gained in the pelvis by symphyseotomy to overcome great disproportion. The effort to deliver the head through the pelvis after symphyseotomy, in highly contracted pelves, results in the death of the fetus and fatal laceration for the mother. It is important that the birth-canal should have previously been dilated or be dilatable, for, if such is not the case, during the delivery of the head after symphyseotomy the anterior vaginal wall will be brought against the severed ends of the pubes, and serious and sometimes fatal laceration, with hemorrhage, will ensue. As symphyseotomy is a child-saving operation, it should not be performed where the fetus is dead or likely to die, and it should not be undertaken in infected women, for it opens a region rich in blood-vessels to the access of septic material. Its range is, therefore, limited, but in this narrow compass it has utility.

Methods of Performing Symphyseotomy.—A method largely employed, giving good results, and among the earliest consists in placing the patient upon her back. The genital canal and the region about the pubes having been prepared by thorough antisepsis, a longitudinal incision in the median line just above the border of the pubes is then made, extending through the skin and fascia, and permitting the operator to separate the recti muscles. The fingers are then passed behind the pubes, pushing the peritoneal sac, which is unopened, upward, and passing the fingers beneath the pubes. The bladder, having been emptied by catheter, a sound or stiff catheter is placed within the bladder and given to an assistant, who depresses the urethra slightly and holds it to one side. A blunt-pointed bistoury or symphyseotomy knife is then passed along the fingers behind and beneath the pubes. With a gentle sawing motion the knife is brought upward and slightly backward until the cartilage is divided and the joint is felt to yield. Two assistants, one on each side, then make pressure upon the trochanters to prevent the pelvis from separating too widely. If the symphyseotomy must be complete, the subpubic ligament is then severed with a blunt-pointed bistoury and the pelvis immediately gapes asunder. From one to two fingers, and sometimes four, can be laid between the ends of the pubes.

While the assistants support the sides of the pelvis by pressure upon the trochanters, the patient is drawn down to the edge of the table and the child delivered, usually by forceps. In many cases the occiput rotates posteriorly and is so delivered with but little difficulty. During delivery pressure is maintained over the sides of the pelvis to prevent overstraining of the sacro-iliac joints. After delivery the uterus is completely emptied, and usually packed with 10 per cent. iodoform gauze. The bladder should again be catheterized and a thorough examination made of the urethra and the anterior vaginal wall for lacerations; if such exist, they should be immediately closed with chromicized catgut, and if the urethra or bladder has been wounded, a catheter, to which a long rubber tube is attached, should be placed in the bladder for drainage. If severely lacerated, the cer-

vix should be repaired, and the pelvic floor and perineum. A vaginal packing of bichlorid gauze should be inserted.

The patient is drawn back upon the table, and the symphyseotomy wound, which was at first tamponed with gauze, is examined after the removal of the tampon. If there be no bleeding, it is usually best to leave a small strand of gauze passing through the abdominal incision to the bottom of the space behind the pubes. The incision is then closed and covered by antiseptic gauze. The lower stitch is left untied, so that it may be brought together after the gauze drain in the wound has been removed. This occurs thirty-six hours after the operation, when the stitch is tied.

The pelvis is immobilized by passing entirely about the pelvis a broad strip of the best quality rubber adhesive plaster, so applied that the center of the strip is over each trochanter. During its application the two halves of the pelvis should be brought tightly together and so held by assistants. Over this may be placed a many-tailed abdominal binder.

After this operation the patient should lie upon her back for a week or ten days, after which the stitches are removed from the symphyseotomy wound and a new adhesive strip or a canvas belt with buckles is applied. The patient may then turn in bed as she desires, and usually sits up at the end of the third week. Her going about will depend upon the individual case and the firmness of the pelvic joints.

The Subcutaneous Method of Symphyseotomy.—This consists in severing the pubic cartilage as one would a tendon in subcutaneous tenotomy. A blunt-pointed, narrow-bladed, strong knife is inserted through the smallest possible incision, cutting the symphysis from above downward; it is then withdrawn and delivery effected in the usual manner.

Open Symphyseotomy.—By the open method, the operator sits in front of the patient, her thighs and legs being flexed and rotated outward, and, pushing to one side the urethra and the tissues about the clitoris, cuts directly down upon the pubic joint. The cartilage and

ligament are severed under direct vision and the delivery performed as before. After delivery the wound is closed with continuous catgut.

The Immobilization of the Pelvis.—In addition to the method described, the pelvis may be immobilized after symphyseotomy by lateral pressure with sand-bags, or by placing the patient upon a canvas cot, which sags sufficiently with her weight to cause the sides of the cot to make pressure against the trochanters. Each of these methods has given satisfactory results.

The Results of Symphyseotomy.—In the majority of cases a practically substantial union of the pubes occurs. In some, where unusual ossification has been present in the cartilage, bony union may develop. In others the joint is mobile for some time after operation. If one or both of the sacro-iliac joints have been severely strained, the patient will have pain in this region indefinitely, and will sometimes complain that she cannot for this reason walk. With other patients walking is difficult because of the movements of the two halves of the pubes. Some patients develop an hysteric fear of locomotion, and it is very difficult to get them to make an effort to walk, although perfectly able to do so. It is only in exceptional cases that necrosis or caries occurs in the joint or that the joint becomes infected.

The Immobilization of the Pelvis at the Time of Operation.—Efforts have been made to hold the severed halves of the pelvis in apposition by drilling or wiring the pubes together. Others have passed stitches of strong chromicized catgut between the periosteum of the severed halves. The proposition has been made to insert sterile ivory between the halves of the pubes to secure permanent enlargement of the pelvis. None of these methods is necessary in the majority of cases.

The Accidents and Complications of Symphyseotomy.—Lacerations of the anterior vaginal wall, opening the pelvic and sometimes the peritoneal cavities, rupture or wounding of the urethra, rupture of the veins about the vulva followed by hematoma of the labia, free

hemorrhage followed or accompanied by infection, injury to the base of the bladder from which the patient recovers very slowly, and septic infection, have all followed this operation. The puerperal period may be complicated by infection, anemia following hemorrhage, prostration the result of slow union and long confinement in a recumbent posture.

The Permanent Results of Symphyseotomy.—If the pelvis is slightly enlarged in its anteroposterior and oblique diameters, the enlargement varying from ½ to 1 cm., and extensive laceration and infection do not occur, the patient has a practically sound pubic bone and is able to work as well as before. If thrombosis of the vessels of the thigh develops, her convalescence may be indefinitely retarded.

The Results of Symphyseotomy for the Child.—As the operation is undertaken largely in the interests of the child, the fetus should escape essential injury. The posterior rotation of the occiput so commonly observed has, in my experience, caused no complications, as the head will be readily delivered by forceps. If the operation has been late, the fetus may be subjected to severe birth pressure, perishing as a consequence.

Mortality and Morbidity.—The maternal mortality of symphyseotomy has been estimated at from 8 to 12 per cent. This did not do the operation justice, for it was undertaken where craniotomy should have been done and where the patient had become exhausted and infected before help was summoned. With a primary operation done in a hospital by competent operators, the mortality of symphyseotomy in properly selected cases does not exceed 2 per cent. The maternal morbidity cannot be accurately reckoned, as it depends so greatly upon the judgment and skill of the individual operator. Here the selection of the operation primarily, before the patients' birth-canal has been bruised or infected by unsuccessful attempts at delivery, greatly lessens the morbidity.

Fetal Mortality and Morbidity.—The fetal mortality and morbidity after symphyseotomy should not be greater than that after

the use of forceps. In marked disproportion, however, fetal mortality and morbidity may be from 75 to 90 per cent.

Symphyseotomy Without Extraction.—In cases seen in the early stage of labor, where marked disproportion is absent, the effort has been made to secure spontaneous extraction by opening the pelvis and awaiting the spontaneous expulsion of the child. The symphyseotomy wound is covered with sterile gauze and every precaution taken to avoid infection. In some of these cases spontaneous labor has resulted, with very satisfactory results. In many, however, it was necessary to complete delivery by operation.

The proximity of the urethra to the incision, the danger of wounding the neck of the bladder, extensive gaping of the two halves of the pelvis, the formation of hematoma in the labia, the ready access of infection to the wound, and the danger of wounding the veins in the central line of the pubes have led operators to choose some other method than symphyseotomy for opening the pelvis. Pubiotomy, brought into prominence first by Gigli, is advanced as an improvement upon symphyseotomy.

Pubiotomy

The Indications for Pubiotomy.—The indications for pubiotomy are those for symphyseotomy: moderate disproportion between the head and pelvis and a birth-canal which has been dilated or is dilatable; to these should be added a sound and uninfected condition of the mother and a vigorous state of the child, for we do not believe, with some, that pubiotomy is an operation for infected cases, nor is it an operation of last resort when other means of extraction fail. As a primary operation justice is done this procedure, but not when otherwise chosen.

The Technic of Pubiotomy.—In performing pubiotomy, that side of the pelvis is usually selected toward which the occiput of the child is directed, and, therefore, the pelvis is usually opened upon the left side. A point is chosen on the outer side of the tubercle which marks the outer aspect of the pubic joint on each half of

the pubic bone. An opening having been made above, over the bone, the fingers are passed behind the pubes and the unopened peritoneal sac pushed upward and backward out of the way. A carrier needle armed with a ligature is then passed around the pubes from below upward; by this means a fine saw is made to encircle the bone. The bone is then severed with the saw from below upward. If bleeding is absent, the pubiotomy wound is closed and delivery effected.

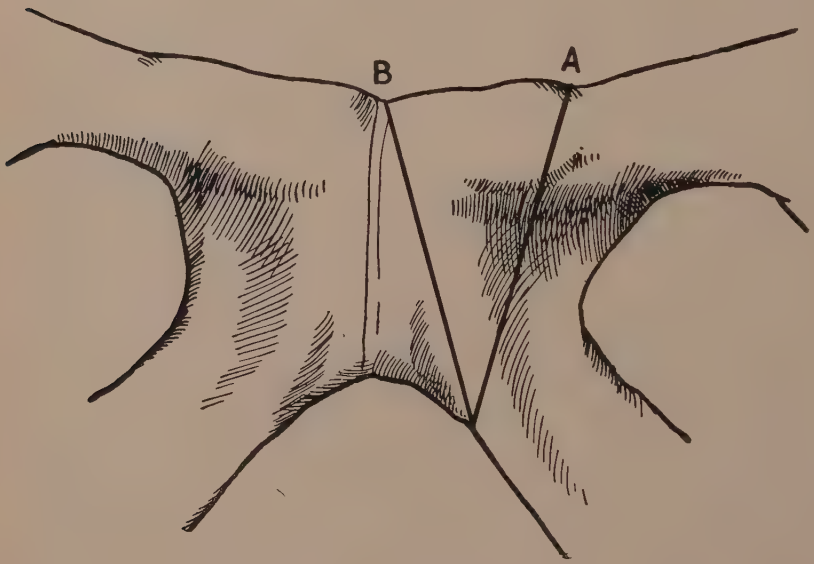

Fig. 166.—The symphysis pubis from the front. The lines A and B represent the directions in which the pubes may be divided in the operation of pubiotomy: A is the direction recommended by Van der Velde; B, that recommended by Gigli (Kerr).

If bleeding develops, the pubiotomy wound is tamponed, delivery effected, and the bleeding subsequently stopped. Döderlein's needle is very commonly employed for passing the saw around the pubes.

In the subcutaneous method the opening is not enlarged sufficiently to admit the fingers, but through the smallest possible aperture the needle is passed around the bone and the saw introduced. In the open method a free incision is made upon the bone and the bone severed under the guidance of vision. As bony tissue is to be trav-

ersed only, a saw will be efficient, hence the use of the blunt-pointed knife employed in symphyseotomy will not avail.

Pubiotomy may be double in rare cases or cases of extreme pelvic contraction. In repeated pubiotomy it is desirable to make the second incision upon the side opposite to the first.

Delivery After Pubiotomy.—The pelvis gapes asunder so soon as the pubes is severed, usually more promptly than after symphyseotomy, as there is no subpubic ligament to hold the bones together. The head enters the pelvis readily in proper cases, and may then be delivered by forceps. The two halves of the pubes after section are seldom in apposition, and do not remain so without artificial support.

The Advantages of Pubiotomy.—In contrast to difficult forceps extraction and prophylactic version in contracted pelves, pubiotomy enlarges the pelvis and permits the egress of the child. It also saves the life of the child, and in this way is in direct competition with craniotomy. It avoids the dangers of abdominal section, leaves the tissues with scarcely an appreciable scar, is not so formidable to the patient and her friends, and leaves the mother, in favorable cases, in good permanent condition.

The Disadvantages of Pubiotomy.—The disadvantages of pubiotomy are: the liability to severe laceration with hemorrhage, often accompanied by infection, injuries to the base of the bladder, thrombosis of the veins of the ower pelvis and thighs, permanent mobility of the pelvis where bony union rarely occurs, and more or less permanent disability following the operation.

In order that the operation should have its just place and its merits be accurately known, it must be an operation of election, a primary operation, performed in hospitals. It is unfitted for septic cases, and as an operation of last resort should give place to craniotomy or abdominal section, followed by hysterectomy. Under these limitations, pubiotomy has a distinct field.

The Results of Pubiotomy for the Child.—In properly selected and well-conducted cases pubiotomy is a child-saving operation.

Where disproportion is marked, forcible delivery by forceps after pubiotomy would subject the fetus to dangerous birth pressure and may be accompanied by fractures of the cranial bones. Its direct infant mortality is nearly that of forceps. In improperly

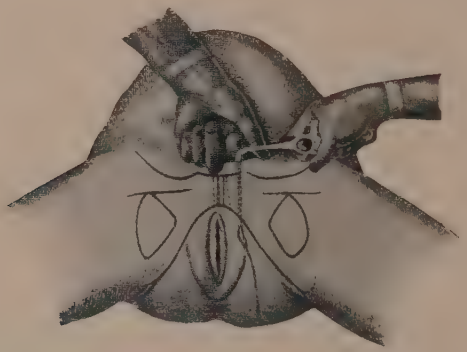

Fig. 167.—Pubiotomy by Döderlein's method (Costa, Annali di Ostetricia, No. 6, 1910).

selected cases its fetal mortality is that of prophylactic version in highly contracted pelves, from 75 to 100 per cent.

The Technic of Pubiotomy.—The operator must beware of complications caused by the saws employed in pubiotomy. These in-

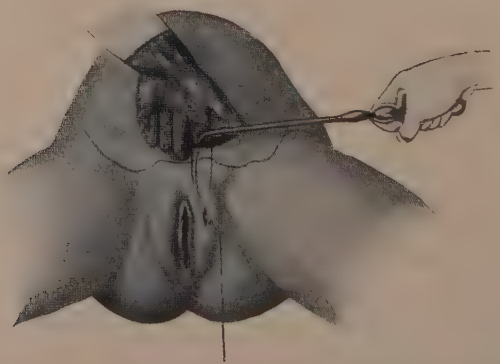

Fig. 168.—Pubiotomy by Döderlein's method (Costa, Annali di Ostetricia, No. 6, 1910).

struments not infrequently break, and hence the operator must be provided with several before commencing the operation. A broken piece of the saw may become fixed in the pubic bone and

its removal occasion difficulty. During the operation severe hemorrhage may develop from a source not readily found. In these cases a vein or venous plexus has been opened, and pressure only

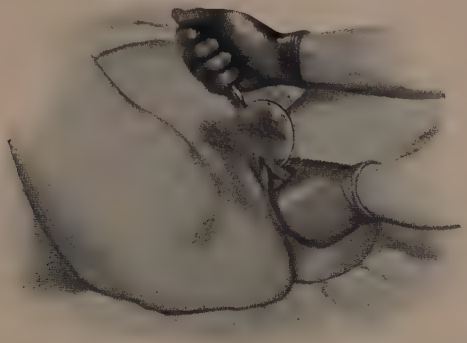

Fig. 169.—Pubiotomy performed by Bumm's method (Costa, Annali di Ostetricia, No. 6, 1910).

can control it. Severe laceration of the pelvic tissues is more apt to follow pubiotomy than symphyseotomy, because the cut ends of the bone are sharper and more readily wound the tissues. In

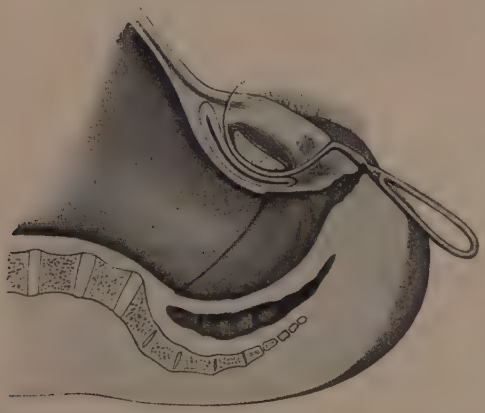

Fig. 170.—Pubiotomy performed by Bumm's method (Costa, Annali di Ostetricia, No. 6, 1910).

delivery after pubiotomy lateral pressure must be made on the trochanters, as after symphyseotomy. The immobilization of the pelvis after the operation is accomplished by the same methods described for symphyseotomy, but efforts to wire together the severed

bones have not been universally adopted. The examination of the pelvis by skiagrams shows fibrous union in the majority of cases.

The Place of Pubiotomy as an Operation.—The abundant literature of the subject reports a varied experience in this operation. Tweedy[1] had sudden and profuse hemorrhage during the operation until the bone was severed. The bleeding ceased suddenly and was easily controlled by pressure. The child was successfully delivered by podalic version. On examination it was found that the bleeding had occurred from severe lacerations in the cervix, which was torn into the lateral fornix. The pelvic wound had become a compound fracture, and this was drained with iodoform gauze. Lacerations

Fig. 171.—Pubiotomy performed by Bumm's method (Costa, Annali di Ostetricia, No. 6, 1910).

were repaired and the patient resuscitated from extreme collapse. The patient recovered, with a widening of $\frac{1}{4}$ inch between the bones. Reifferscheid[2] gives the maternal mortality as 5.94 per cent. Semmerlink[3] had extensive injury to the bladder during pubiotomy, from which the patient recovered by constant drainage. Baumm[4] had 10 successful cases; in 5 there were severe lacerations; in 3 partial necrosis of the ends of the bone occurred; in 7 the puerperal period was complicated; in none did a firm callus form after

[1] Journal of Obstetrics and Gynecology of the British Empire, May, 1907.
[2] Zentralblatt f. Gyn., No. 48, 1906. [3] Ibid.
[4] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 4, 1907.

operation. Hocheisen[1] followed Baumm's method, which consists in the subcutaneous use of Baumm's needle. The insertion of the

Fig. 172.—*a*, Left pubic tubercle; *b*, absence of right pubic tubercle (Costa, Annali di Ostetricia, No. 6, 1910).

Fig. 173.—*a* and *b*, Line of section (Costa, Annali di Ostetricia, No. 6, 1910).

needle makes the wound not larger than .5 cm., readily closed by catgut immediately after the operation. The nearer to the symphysis

[1] Archiv f. Gyn., Band 80, Heft 1, 1906.

the needle was passed, the less was the bleeding. After delivery the genital tract was firmly tamponed with gauze, a T-bandage placed over the vulva, and a firm binder around the pelvis. Spontaneous

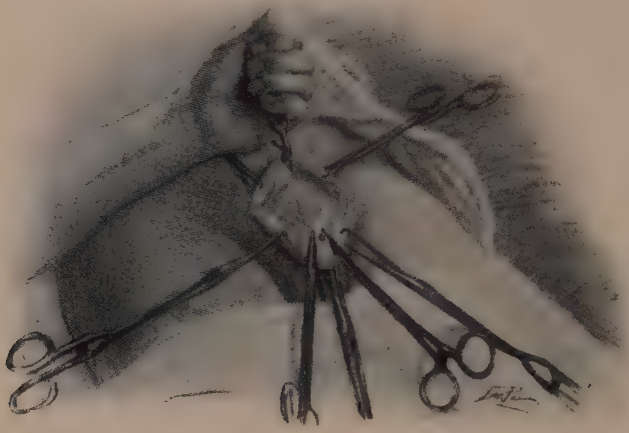

Fig. 174.—Operation by open method (Costa, Annali di Ostetricia, No. 6, 1910).

labor was awaited, and if this did not occur, the forceps was applied. In 1 of these patients vesicovaginal fistula followed, which closed

Fig. 175.—Resulting scar (Costa, Annali di Ostetricia, No. 6, 1910).

spontaneously. In 1 an *X*-ray picture of the pelvis showed that symphyseotomy instead of pubiotomy had been performed. In another a very extensive tear occurred near the urethra and the

patient's puerperal period was complicated by thrombosis. In 5 per cent. the puerperal period was normal, while in 50 per cent. some complications arose. One child died shortly after the operation.

Zweifel[1] performed 52 symphyseotomies by the open method and 12 subcutaneous symphyseotomies; 2 pubiotomies by the open method and 1 subcutaneous pubiotomy. In the symphyseotomies done by the open method 3 women and 4 children died. The 2 pubiotomies done by the open method had fever, but finally recovered. The subcutaneous pubiotomy did better. Among the subcutaneous symphyseotomies no mother died. Döderlein[2] collected the records of 294 cases of pubiotomy; by the open method the maternal mortality was 10.4 per cent., by the subcutaneous, 4.1 per cent. The highest mortality occurred in patients infected at the time of operation. Among these the mortality was 12.5 per cent.; among 149 not infected at the time of operation but 1 died. In infected cases Döderlein would perform embryotomy and not pubiotomy. The dangers of hemorrhage and wounds of the surrounding tissues are emphasized. In 55 cases done by the open method there was 1 severe laceration of the bladder, followed by death from sepsis. In 170 subcutaneous pubiotomies, injuries to the urinary tract occurred in 25. By his own method of operating Döderlein avoided such accidents, and calls attention to the importance of guarding the bladder and urethra by the finger applied along the posterior wall of the pubes. The operation, although subcutaneous, is thus done under control of the finger and injury can be avoided. Lacerations opening into the vagina must often occur in primiparæ delivered after pubiotomy by forceps. In the 55 cases by the open method, 8 such injuries occurred, 2 of which were severe. All of these patients were delivered by forceps, 6 were primiparæ and 2 multiparæ. In the 170 subcutaneous operations, injuries communicating with the vagina occurred in 20—12 primiparæ and 8 multiparæ; 15 of these patients were delivered by forceps, 4 by version and extraction. Among 19 spontaneous labors

[1] Verhandl. d. deutschen Gesell. f. Gyn., Band 12, p. 33; Zentralblatt f. Gyn., p. 163, 1907; Annali d. Gyn. et d'Ost., p. 531, Sept., 1907. [2] Ibid.

following pubiotomy there occurred no severe injury. In primiparous patients with poorly developed birth-canal, incisions into the vagina and pelvic floor should be made before delivery. The formation of hematoma is not attended with great danger unless it is accompanied by wounding of the urinary tract, through which infection gains access to the hematoma.

So far as the children were concerned, in 55 cases done by the open method 3 deaths occurred among the children. In 170 cases by the subcutaneous method there were 12 fetal deaths. These resulted from cerebral lacerations and intracranial bleeding. All of these children were delivered by forceps extraction; there was 1 case of prolapse of the cord. Spontaneous labor after pubiotomy is most favorable for the child. In choosing the operation Döderlein would not perform it in a pelvis whose true conjugate was less than 6.75 cm.

As regards the permanent enlargement of the pelvis following pubiotomy, in 8 patients subsequent labors seemed not to be made easier nor the pelvis larger by pubiotomy. In 5 of the 8 patients pubiotomy was done the second time; the children were larger than in the first labor, as is naturally the case. If spontaneous labor is to occur after pubiotomy, it must happen from some other cause than the enlargement of the pelvis. The severed bones rarely heal firmly, but usually by fibrous tissue.

In the same discussion, Baumm reports 43 cases, with the recovery of all the mothers and the loss of 2 children. Frantz had operated upon 11 cases, losing 1 mother from double thrombosis in the spermatic veins. In 1 case the patient was unable to walk two months after operation, and in a third case inguinal hernia developed through the separated ends of the bones. Fehling operated on 19 cases; Küstner, on 5; Rosthorn, on 8; von Herff, on 5; Baumm, on 14; Walcher, on 15, with 3 cases of laceration of the bladder; Fromme, on 13, with the death of no mother and 1 child, and in 15 cases, with 1 mother and 1 child lost. The majority of these operators preferred the subcutaneous method. Efforts to increase the size of the

pelvis after pubiotomy have been made by Hammerschlag and Polano. These efforts have not been successful. In a case observed by Tandler one and a half years after pubiotomy so large a callus was present that the size of the pelvis was lessened and not increased. When a second pubiotomy was made there occurred a connective-tissue union, through which the bladder wall and peritoneum prolapsed. Although it would seem that the bladder would be more often injured after symphyseotomy than after pubiotomy, Zweifel, in 65 cases of symphyseotomy, saw no injury to the bladder or urethra.

There is no question about the added frequency of thrombosis after pubiotomy. Kannegieser[1] reports 30 cases of subcutaneous pubiotomy in the Dresden Clinic, and, reviewing the literature of the subject, finds the maternal mortality variously estimated at from $2\frac{1}{2}$ to 10 per cent. The fetal mortality he states at 19 per cent. for operations for enlargement of the pelvis, and 40 per cent. for induced labor. In his own cases he had a maternal mortality of nil, but morbidity averaging 55 per cent. The fetal mortality in his cases averaged 8 per cent. In 23 cases he studied carefully the after-effects of the operation, the *x*-ray showing the complete formation of bone in 7 cases. There was enlargement of the diagonal conjugate varying considerably in amount, and in many patients there was unusual mobility in the pelvic joints. He collected 15 cases, in which spontaneous birth, with full-term children, occurred after pubiotomy. Lichtenstein[2] has studied the results of version and extraction before and after pubiotomy. In 110 cases, where the child was turned before the pubes was opened, fetal mortality was 32.81 per cent.; in 44 cases, in which the child was not turned until after the pelvis was opened, fetal mortality was 13.64 per cent. The average fetal mortality in pubiotomy, when the child was delivered by version and extraction, was 22.62 per cent. In 39 pubiotomies, in his clinic in Berlin, Martin[3] saw injuries to the bladder and urethra in 3 cases. Sigwart[4] had 5

[1] Archiv f. Gyn., Band 81, Heft 3, 1907. [2] Ibid.
[3] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 5, 1907.
[4] Zentralblatt f. Gyn., No. 20, 1907.

pubiotomies in private houses; the mothers recovered, but the puerperal period was complicated, and one of the children died. Delivery was effected by forceps or version. Truzzi,[1] after pubiotomy, inserted between the halves of the pubes a piece of calf's rib, 14 mm. wide and 3 cm. long, decalcified in 19 per cent. alcohol and then soaked in salt solution. No stitches were used and the bone was held in position by pressure. Good union occurred with considerable enlargement of the pelvis. Seitz[2] examined with the cystoscope, twenty days after operation, a patient who had a wound in the bladder after pubiotomy. The wound had healed, but a diverticulum in the bladder had formed. Mann[3] observed necrosis of the pelvic bone after pubiotomy, the patient being unable to walk for some time. The dead bone was discharged through a fistula, which finally closed. The patient became pregnant and had a spontaneous abortion at three months. Hernia developed in the scar of the operation. Krömer,[4] after pubiotomy and extraction with forceps, found in his patient a wound in the tissues near the urethra. This was closed by suture, but the patient's recovery was prolonged and complicated. She walked with pain on leaving the hospital fifty-seven days after operation. At the next pregnancy pubiotomy was again performed, with the hope that spontaneous labor would follow. It did not, however, and the patient was delivered by vaginal Cesarean section, with version and extraction. Mother and child recovered. In a fatal case, Hammerschlag[5] found that the pubiotomy wound had made an opening 3 cm. long into the bladder. Offergeld[6] experimented in an endeavor to increase the formation of bony tissue between the halves of the pubes. His conclusions are that firm bony tissue cannot be expected in these cases, that the action of the saw during the operation, and the fluids which collect through hemorrhage and congestion, prevent the development of bony tissue. He also endeavored to ascertain the best method for preventing infection in wounds after pubiotomy. Where such com-

[1] Zentralblatt f. Gyn., No. 20, 1907. [2] Ibid., No. 20, 1907.
[3] Ibid., No. 44, 1907. [4] Ibid., No. 44, 1907. [5] Ibid., No. 33, 1907.
[6] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Hefts 1 and 2, 1907.

municated with the vagina a fatal result usually followed. He endeavored to counteract infection in the medulla of the pelvic bone by producing venous hyperemia through pressure applied by bandages. The patient's temperature did not fall, but her general condition became better. Scheffzek[1] reports 9 symphyseotomies and 18 pubiotomies in 1301 cases of contracted pelves. There were severe lacerations of the vagina in 7 cases, 2 of which terminated fatally. In 3 of these patients the wounds made the fracture compound, but 29.6 per cent. of the mothers had normal puerperal periods. The others all had complications of greater or less severity. The fetal mortality was 33⅓ per cent. in both symphyseotomy and pubiotomy; in pubiotomy alone, 27.7 per cent.

Williams[2] reported 13 operations for pubiotomy, 9 by himself and 4 by his assistants, with no maternal and 3 fetal deaths. The pelves were 6 generally contracted rachitic, 2 flat rachitic, 2 justo-minor, and 3 funnel shaped.

In the first 10 the true conjugate measured from 7 to 8.5 cm. (2.8 to 3.4 inches); the funnel-shaped pelves had transverse diameters at the outlet of 7 cm. (2.8 inches). In 11 cases the operation was not performed until the patient had been in the second stage of labor from two to ten hours. The presenting part had failed to advance. Manual dilation of the vulva and vagina was performed before beginning the operation, and Döderlein's method was followed, except in 1 case, where Gigli's open method was chosen. The child was immediately delivered by forceps in 10 cases, by breech extraction in 3. There was but slight hemorrhage in 12, and in 1 case profuse bleeding and shock from a deep vaginal tear communicating with the pelvic cavity. Of the 13 patients, 9 were primiparæ; in 3 patients suture of perineal tears was required; in none was the bladder injured, and in none was the urine blood stained. When the placenta had been delivered, vaginal and perineal wounds were repaired and healed satisfactorily. The upper pubiotomy incision

[1] Archiv f. Gyn., Band 88, Heft 3, 1909.
[2] American Journal of Obstetrics, August, 1908.

was first closed with interrupted catgut and then a small drain of iodoform gauze was passed through the labial opening and a broad band of adhesive plaster about the hips. In bed a Bradford frame was used to immobilize the pelvis. The patient was allowed to move as soon as she felt inclined, and usually turned upon her side in a few days after the operation.

Although these operations proceeded favorably, the puerperal period was undisturbed in only 6 cases. In 7 the temperature ranged from 105.2° to 102.5° F. In 2 cases there was considerable distention, but no serious infection developed.

The earliest getting out of bed was on the fourth day, when one patient did so without leave, but without serious injury. With one exception, the patients got up between the sixteenth and twenty-third days; on the average, the twentieth; leaving the hospital on the thirtieth day. Most of them walked without difficulty, a few of them having a slight limp for a short time. Of the 13 patients, 10 were seen afterward, reporting themselves in good health.

So far as the immediate results of the operation were concerned, in more than half the cases caries formed on the anterior pubic surface. Posteriorly the bone was smooth, and in some a notch could be felt upon the upper and lower margins, showing the ends of the incision. There was no bony union. In 4 cases the cut ends of the bone moved when the patient walked. The sacro-iliac joints were injured in 1 case, but this disappeared after a month. The pelvis remained unchanged after operation, except in 1 funnel-shaped pelvis, where the distance between the ischia increased 1 cm. (.39 inch). All the patients showed edema of the vulva, pronounced in 3 on the side of operation; 2 patients had hematocele with induration; 1, phlebitis in the leg; 1, stitch infection, and in 3 it was necessary to use the catheter for some time.

One child was lost after breech extraction from asphyxia; one child died of birth pressure.

Pregnancy had occurred after the operation in 3 of the patients, and 1 had spontaneous birth, the biparietal diameter of the fetal

cranium measuring 8.5 cm. (3.4 inches). In these mothers' pelves the true conjugate was 7 cm. (2.8 inches). Another patient has since been pregnant twice, having spontaneous premature labor at the seventh month.

In the majority of these cases Döderlein's was the method employed, consisting in introducing the finger through a small incision along the upper border of the pubic arch, in the region of the pubic spine. The soft parts were then separated from the posterior surface of the pubic bone. The bladder was thus protected and the small incision was not prejudicial. A curved needle was then passed through the labium majus beneath the bone. This method was satisfactory.

It was thought of great importance in these cases that the vaginal outlet should be thoroughly dilated by the gloved hand before beginning the operation.

Cesarean section early in labor, under favorable circumstances, has a maternal mortality of 1.2 per cent., with no mortality for the child. The maternal mortality of pubiotomy should be less than 2 per cent. in primary operations. This is much less than that of symphyseotomy.

Williams believes that the induction of labor in moderate degrees of pelvic contraction will be superseded by pubiotomy. In these cases but 5 or 6 per cent. require operation, while if the induction of labor be done, pregnancy would be interrupted unnecessarily in from 25 to 30 per cent. The fetal mortality in induced labor is much higher than after pubiotomy. Pubiotomy competes with high forceps, prophylactic version, and craniotomy rather than with Cesarean section. It should be strictly kept as a primary operation for uninfected cases, and not selected after the failure of high forceps for version. Under these circumstances craniotomy should be selected. To be successful the operation should be limited to hospitals and to experienced operators.

The Pelvis After Pubiotomy.—To determine the permanent condition of the pelvis after this operation, Christofoletti[1] examined the

[1] Zentralblatt für Gynäkologie, No. 14, 1908.

pelvis in 2 patients dying some time after the operation. There was considerable bony callus on the interior surface of the pelvis, the levator ani muscle had been injured in delivery, and the distance between the symphysis and the ileopectineal tubercle was increased on the side of operation. In another case there was no bony union, and very slight enlargement on the operative side. The slight increase in pelvic size gained by the operation was considerably lessened by the development of callus on the internal pelvic surface.

Bürger[1] found the pelvis permanently enlarged in 25 patients operated upon in Schauta's clinic. The true conjugate was increased in some 1 cm. Union was fibrous, rarely bony.

To Procure a Permanent Enlargement of the Pelvis.—Among other methods Schickele[2] incised the bone about one-third of its thickness, prolonging the incision laterally, bringing the saw out on the opposite surface. This incision is planned to avoid bony union, and, by making the cut of considerable length, secures fibrous union, providing for considerable pelvic enlargement.

In Bumm's experience[3] 52 cases with the subcutaneous method had given satisfactory results. One patient only died from embolic pneumonia.

Jardine[4] operated upon a case of moderate pelvic contraction whose recovery was complicated by severe lacerations, vesico-vaginal fistula, and necrosis of the bone. The patient was discharged three months after admission with fibrous union of the pelvis, and able to walk comfortably. His unfavorable opinion of the operation is shared by Peham.

In estimating the final results of the operation, it is abundantly proved that bony union cannot be expected. Oberndorfer[5] examined the pelvis fourteen months after operation. His radiograms and illustrations of microscopic sections failed to show the slightest evidence

[1] Zentralblatt f. Gynäkologie, No. 14, 1908.
[2] Ibid., No. 17, 1908. [3] Ibid., No. 19, 1908.
[4] Journal of Obstetrics and Gynecology of the British Empire, March, 1908.
[5] Zentralblatt f. Gynäkologie, No. 7, 1908.

of bony union. The histologic elements necessary for the production of bone were entirely wanting.

Disturbance of locomotion following pubiotomy has been reported by various writers. The French believe that in comparison with symphyseotomy, pubiotomy is followed by fewer complications.

Jeannin and Cathala[1] published in tabulated form 39 cases by French operators, showing favorable results for the mothers. The puerperal period, however, had a high morbidity rate.

The most extensive recent paper giving the results of pubiotomy is that of Schläfli.[2] In all, he has collected and examined the results of 700 cases. The general mortality rate for the mothers was 4.82 per cent.; for the children, 9.18 per cent. In 510 cases, hemorrhage immediately following operation required attention. This varied in degree, from hemorrhage proving rapidly fatal, to that of moderate quantity. In 15.49 per cent. of cases lacerations occurred opening into the vagina. The usual tear of the pelvic floor occurred in about 18 per cent. In general, laceration of the birth-canal proved fatal in 40.6 per cent. of cases. The bladder was wounded in 12.35 per cent., the puerperal period complicated by fever in 31.76 per cent., and by thrombophlebitis in 8.23 per cent. There was hernia between the cut ends of the bone in 7.5 per cent., prolapse of the vagina in 24.17 per cent., and incontinence of urine in 4.17 per cent.

Comparing these statistics with those of symphyseotomy and other methods of delivery, it is evident that pubiotomy is not a simple operation, and one to be chosen only under the most favorable circumstances.

Bibliography of Symphyseotomy, Pubiotomy, Hebosteotomy

Allen: American Journal of Obstetrics, August, 1906.

Baumm: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 4, 1907.

Bauer: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 1, 1908.

[1] L'Obstétrique, October, 1908.

[2] Zeitschrift f. Geburtshülfe und Gynäkologie, Band 64, Heft 1, 1909.

Bertino: La Ginec. Revista practica., vol. 4, p. 73, 1907.
Brun: Annali di Ostetricia, No. 6, 1907.
Bumm: Zentralblatt f. Gynäkologie, No. 32, 1906, and No. 19, 1908.
Bürger: Gyn. Rundsch., p. 489, 1907; Verh. der deutsch. Ges. f. Gyn., Band 12, p. 287, 1907.
Christofoletti: Zentralblatt f. Gynäkologie, No. 14, 1908.
Credé: Zentralblatt f. Gynäkologie, No. 23, 1906.
Döderlein: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 93, 1907, full discussion; Surgery, Gynecology and Obstetrics, February, 1908.
Ehrlich: Zentralblatt f. Gynäkologie, No. 20, 1908.
Fehling: Zentralblatt f. Gynäkologie, Nos. 44 and 48, 1906.
Ferroni: Annali di Ostetricia, No. 2, 1908.
Frank: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 15, Heft 5, 1902, and Band 25, Heft 3, 1907; Zentralblatt f. Gynäkologie, No. 20, 1907.
Fry: American Journal of Obstetrics, March, June, July, August, 1907; Surgery, Gynecology, and Obstetrics, vol. 5, No. 2, August, 1907.
Füth: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 273, 1907.
Gauss: Zentralblatt f. Gynäkologie, p. 857, 1907.
Gibson: Journal of Obstetrics and Gynecology of the British Empire, May, 1907.
Gibson, Tweedy: Journal of Obstetrics and Gynecology of the British Empire, May, 1907.
Gigli: Zentralblatt f. Gynäkologie, No. 41, 1905.
Guiccardi: Zentralblatt f. Gynäkologie, No. 28, 1908.
Hammerschlag: Zentralblatt f. Gynäkologie, No. 33, 1907.
Hartmann: Zentralblatt f. Gynäkologie, No. 21, 1907.
Henkel: Zentralblatt f. Gynäkologie, No. 8, 1906; Zeitschrift f. Geburtshülfe und Gynäkologie, Band 57, Heft 1, 1906; Verh. der deutsch. Ges. f. Gyn., Band 12, p. 244, 1907; Münchener med. Wochens., p. 1368, 1907.
Herman: Transactions, Obstetrical Society of London, vol. 42, Part 4, 1900.
Hocheisen: Archiv f. Geburtshülfe und Gynäkologie, Band 80, Heft 1, 1906.
Jardine: Journal of Obstetrics and Gynecology of the British Empire, March, 1908.
Jeannin and Cathala: L'Obstétrique, October, 1908.
Jessen: Zentralblatt f. Gynäkologie, No. 8, 1906.
Jewett: American Journal of Obstetrics, December, 1906.
Jewett, Mann, Reynolds, Fry: American Journal of Obstetrics, September, 1901.

Kannegeiser: Archiv f. Gynäkologie, Band 81, Heft 3, 1907.
Kehrer: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 2, Heft 2, and Band 2, Heft 3, 1905.
Krömer: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 281, 1907; Zentralblatt f. Gynäkologie, No. 41, p. 1231, 1907; Hegar's Beitr. z. Geb. u. Gyn., p. 255, 1907.
Leopold: Zentralblatt f. Gynäkologie, p. 1319, 1907.
Lerda: Zentralblatt f. Gynäkologie, No. 1, 1908.
Lichtenstein: Archiv f. Gynäkologie, Band 81, Heft 3, 1907.
Maire: Presse. méd., No. 69, 1907.
Mann: Zentralblatt f. Gynäkologie, No. 44, 1907.
Martin: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 5, 1907.
Mayer: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 332, 1907; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, 1907.
Menge: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 313, 1907.
Müller: Korrespondenzblatt f. Schweizer Arzte, p. 612, 1907.
Nacke: Zentralblatt f. Gynäkologie, p. 1633, 1907.
Neu: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 27, Heft 4, 1908.
Oberndorfer: Zentralblatt f. Gynäkologie, No. 7, 1908.
Offergeld: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Hefts 1, 2, and 6, 1907.
Peham: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 328, 1907; Zentralblatt f. Gynäkologie, No. 23, 1908.
Pinard: Therapeutique a. la Clinique Baudeloque, 1889–1907.
Pisarzewski: Gaz. Lekarska, No. 36, 1907.
Preller: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Hefts 4 and 5, 1907; Zentralblatt f. Gynäkologie, No. 20, p. 44, 1907.
Prentiss: American Journal of Obstetrics, May, 1909.
Rainer: Zentralblatt f. Gynäkologie, No. 45, 1907.
Raineri: Zentralblatt f. Gynäkologie, p. 1401, 1907; La Rassegna. d'Ostetricia e. Ginec., No. 16, 1907; Annali di Ostetricia e. Ginecologia, vol. 2, No. 29, 1907.
Reifferscheid: Zentralblatt f. Gynäkologie, No. 48, 1906; Verh. der deutsch. Ges. f. Gyn., Band 12, p. 316, 1907.
Rissmann: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 57, Heft 3, 1906.
Rühle: Archiv f. Gynäkologie, Band 82, 1907; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 24, Heft 3, 1906.
Ruppert: Hegar's Beiträg. z. Geburtshülfe und Gynäkologie, Band 11, 1907.

Sachs and Lehmann: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 1, 1908.

Sandstein: Journal of Obstetrics and Gynecology of the British Empire, March, 1902; British Medical Journal, January 25, 1902.

Scheib: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 295, 1907; Deutsche med. Wochens., No. 437, 1906.

Schickele: Zentralblatt f. Gynäkologie, No. 17, 1908.

Schläfli: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 64, Heft 1, 1909.

Seeligmann: Zentralblatt f. Gynäkologie, No. 5, 1907.

Seitz: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 957, 1907; Zentralblatt f. Gynäkologie, No. 17, 1907.

Sellheim: Zentralblatt f. Gynäkologie, No. 27, 1905; Deutsche med. Wochens., p. 888, 1907.

Semmerlink: Zentralblatt f. Gynäkologie, No. 48. 1906.

Sigwart: Zentralblatt f. Gynäkologie, No. 20, pp. 553, 1181, 1907, and No. 48, 1908.

Stöckel: Verh. der deutsch. Ges. f. Gyn., Band 12, 1907; Zentralblatt f. Gynäkologie, No. 3, 1906.

Thies: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 342, 1907; Zentralblatt f. Gynäkologie, p. 875, 1907; Archiv f. Gynäkologie, Band 84, p. 99, 1907.

Toth: Zentralblatt f. Gynäkologie, No. 49, 1908.

Truzzi: Zentralblatt f. Gynäkologie, No. 20, 1907.

Tweedy: Journal of Obstetrics and Gynecology of the British Empire, May, 1907.

Van de Velde: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 270, 1907; Wiener m. Wochens., No. 29, 1907.

von Elischer: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 257, 1907.

von Franqué: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 230, 1907.

Walcher: Zentralblatt f. Gynäkologie, p. 929, 1907.

Waldstein: Gyn. Rundschau, p. 34, 1907.

Williams: American Journal of Obstetrics, August, 1908.

Wilson: Obstetrical and Gynecological Section of the Royal Society of Medicine, London, October 10, 1907; Lancet, p. 1534, 1907; Journal of Obstetrics and Gynecology of the British Empire, January, 1908.

Zangemeister: Zentralblatt f. Gynäkologie, No. 48, 1906.

Zweifel: Verh. der deutsch. Ges. f. Gyn., Band 12, p. 33, 1907; Zentralblatt f. Gynäkologie, p. 163, 1907; Ann. de Gyn. et d'Obst., p. 531, September, 1907; Zentralblatt f. Gynäkologie, No. 1, 1905, and No. 26, 1906.

VAGINAL EXTRACTION PRECEDED BY SECTION OF THE CERVIX, LOWER UTERINE SEGMENT, OR PERINEUM

In cases where, through lack of development or stenosis from any cause, the lower portion of the uterus, the pelvic floor, or perineum may be so contracted as to make vaginal delivery dangerous, the birth-canal may be enlarged by section. Clinical observation has shown that a contracted cervix will often tear irregularly to a dangerous extent. This fact has led obstetricians at different times to incise the cervix, but it remained for Dührssen to practice and devise deep incisions into the cervix to permit delivery. These were made in the four quadrants of the cervical circle, avoiding the lateral portions, the incisions being directed upward and outward at the outlet. They were carried to the vaginal junction and resulted in the immediate enlargement of the cervix.

These incisions, however, did not reach sufficiently far to overcome entirely the resistance of the cervix, nor did they enter the lower uterine segment. Dührssen, accordingly, developed the technic of what he termed "vaginal Cesarean section," which has now a recognized place among obstetric operations.

Incision of the Cervix

Incision of the cervix is justifiable where cervical tissue cannot be stretched without danger of extensive lacerations. Where the cervix dilates with difficulty, it will often tear irregularly if stretched.

A clean incision is safer than irregular lacerations, and hence it is justifiable to substitute the one for the other.

Cases are sometimes seen where the external os can be found with difficulty from congenital occlusion. The writer recalls a case in which hemorrhage occurred during the first stage of labor, from a source not evident. The cervix was not dilated, although the patient had had considerable pain. The external os, upon ordinary examination, could not be found. On inspection an oblique tear in the substance of the cervix extended in an irregular manner to the vaginal junction, beginning ½ inch above the external os. This

tear had opened small vessels, which bled freely. The external os barely admitted a grooved director, and was drawn upward and

Fig. 176. –Incision of the cervix where the latter is taken up, but the os externum is only slightly dilated. Dark lines show direction in which incisions should be made (Kerr).

backward so as to be scarcely accessible. The cervix was incised, when hemorrhage ceased and labor proceded.

In practising incision of the cervix the operator should have a clear view of the field of operation. Blunt-pointed stout scissors should be used, and four cuts made extending to the vaginal junction. The immediate opening of the cervix follows and usually the descent of the presenting part. After delivery the incisions may be closed by chromicized catgut. Even if this be not done, if the patient escapes infection, union usually takes place throughout the greater portion of the incision.

Bibliography of Incision of Cervix and Perineum

Aschoff: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 5, 1905.
Brindau: Zentralblatt f. Gynäkologie, No. 18, 1907.
Dührssen: Surgery, Gynecology, and Obstetrics, March, 1906.
Jardine: Glasgow Medical Journal, 1907.
Leopold: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 1, 1905.
Lepage: Zentralblatt f. Gynäkologie, No. 19, p. 545, 1907.
Rouvier: L'Obstétrique, August, 1908.

Vaginal Cesarean Section

In vaginal Cesarean section incisions are carried through the cervix and lower uterine segment nearly to the lower border of the superior expulsive segment of the uterus. To permit this without injury to the bladder or peritoneum both must be pushed upward out of the way.

The Technic of Vaginal Cesarean Section.—The patient is prepared as for any vaginal operation. The bladder is thoroughly emptied by catheter under anesthesia. The patient is placed on the edge of the table, her lower extremities flexed and rotated outward, and the cervix and surrounding tissues completely exposed by specula. The cervix is strongly grasped by tenaculum forceps and drawn gently downward, and a transverse incision made in front of the cervix through the mucous membrane. With the finger, a blunt instrument, or blunt-pointed scissors the bladder and tissue beneath it is then pushed upward with the peritoneum; the lower

uterine segment then becomes visible. A longitudinal incision in the median line is then made through the narrow portion of the cervix, extending into or through the lower uterine segment. When the operation was first practised a similar incision was made in the posterior wall of the cervix, but this has been found to be rarely necessary. When the uterus is opened the presenting part comes into view

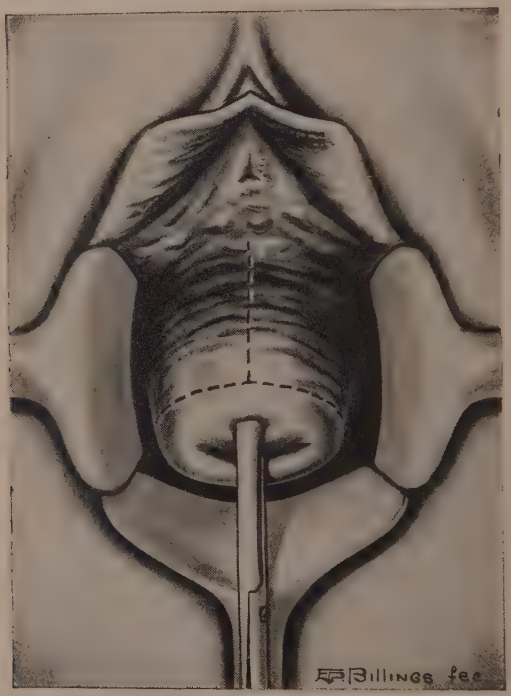

Fig. 177.—Vaginal Cesarean section: Cervix drawn forcibly downward by volsella forceps. Longitudinal and transverse incisions in anterior vaginal wall. Lateral retractors used for purposes of illustration not necessary for operation (Peterson).

or can readily be reached. Delivery is then effected, preferably by forceps, although version has been performed. Care is taken to deliver the child slowly and carefully to avoid lacerating the uterus. After the child is born the placenta is removed, usually manually, the uterus emptied of clots, membranes, and amniotic liquid, and tamponed with 10 per cent. iodoform gauze. The longitudinal incision in the lower uterine segment and cervix is first closed, followed by

the uniting of the transverse vaginal incision The vagina is then moderately tamponed with bichlorid gauze. Where a posterior cervical incision is made, this is closed in the manner described.

The Indications for Vaginal Cesarean Section.—Some conditions which require the prompt emptying of the uterus, circumstances being favorable for vaginal delivery, indicate vaginal Cesarean sec-

Fig. 178.—Vaginal Cesarean section: Vaginal wall dissected away from bladder wall for short distance on each side of incisions. Bladder dissected from uterus by few strokes with sponge (Peterson).

tion. This method is often selected in eclampsia, in premature separation of the normally situated placenta, in threatened death of the mother from heart disease, in threatened occlusion of the umbilical cord, and in the event of sudden death of the mother, the fetus surviving.

Vaginal Cesarean section is not indicated in contracted pelvis, for it does not enlarge the pelvis. Its performance is an error under

these conditions. It is also contraindicated in septic cases because it leaves the septic uterus in a condition favorable for the development of severe infection. It is also not indicated in overgrowth of the fetus or in considerable disproportion between mother and child, and its performance in these cases will be followed by disappointing results.

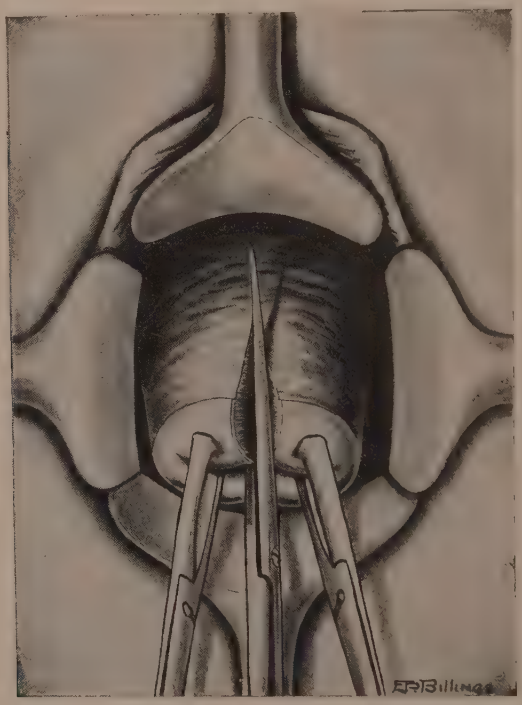

Fig. 179.—Vaginal Cesarean section: Cervix grasped at each side of median line by volsella forceps. Cervix split upward in median line by stout scissors. Bladder held up behind pubes by retractor or sponge (Peterson).

Complications Following the Operation.—The element of greatest danger in the operation is the occurrence of bleeding, which makes the development of septic infection an easy matter. It is not always easy to expose the field of operation to vision, and without such guidance the operator may carry the incisions further than is necessary, thereby opening into very vascular tissue, which bleeds easily and tears readily during delivery. Wounds of the urethra and base of

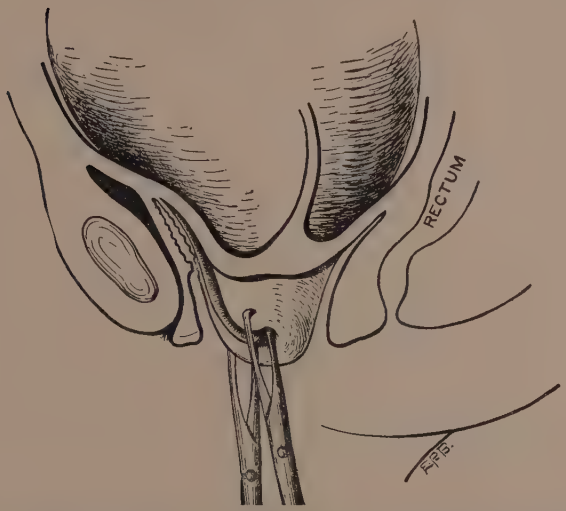

Fig. 180.—Vaginal Cesarean section: Profile view, showing anterior cervical wall split upward as far as peritoneal reflexion. Same kind of incision can be made in posterior cervical lip (Peterson).

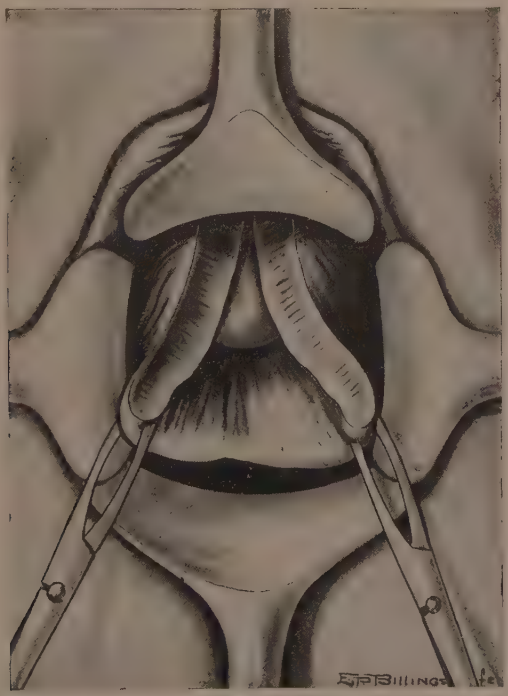

Fig. 181.—Vaginal Cesarean section: Anterior cervical wall split upward. Membranes bulging downward. Through this opening child can be delivered by version or forceps (Peterson).

the bladder, lacerations extending through the vagina into the pelvic and abdominal tissues, and their results have been observed.

The advantages claimed for the operation are its rapidity, the fact that it avoids abdominal and peritoneal incision, that it is less formidable to patients than abdominal section, leaves no visible scar, the patient remaining in good condition after the operation. Those who advocate it most strongly have urged that it is suitable for per-

Fig. 182.—Vaginal Cesarean section: Forceps introduced through incision. It is better to incise posterior cervical wall than to have opening too small (Peterson).

formance in private houses. Experience has shown that to be successful it requires hospital facilities and trained assistance.

Vaginal Cesarean Section for Placenta Prævia.—Theoretically, vaginal Cesarean section would be indicated for placenta prævia. In this condition, however, the cervix and lower uterine segment are more soft than normal and yield more readily to dilation. At present better results are obtained in placenta prævia by dilating the

cervix sufficiently to permit the introduction of a dilating bag. This, folded, should be passed through the membranes or placenta, then distended. It will make pressure upon the placenta, checking hemorrhage and dilating the cervix for delivery.

The Application of Vaginal Cesarean Section.—Retroflexion and incarceration of the pregnant uterus was successfully treated by

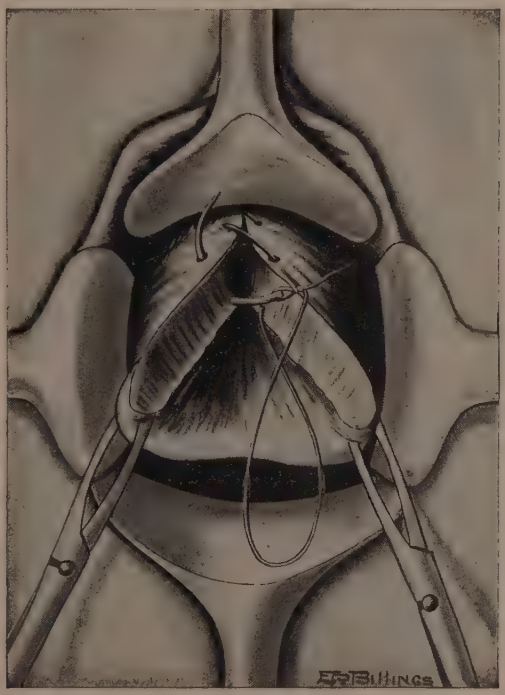

Fig. 183.—Vaginal Cesarean section: Incision closed by continuous suture of chromicized catgut. Suture should pass down to, but not through, cervical mucosa (Peterson).

Benecke.[1] The pregnancy was five months advanced, the fetus had perished, the bladder had become infected, the cervix was dense and could be dilated with the greatest difficulty only. During the vaginal operation the bladder wall was opened, followed by the evacuation of its contents. Lacerations were immediately sutured with catgut, the uterus emptied in the usual manner, incisions closed, and

[1] Zentralblatt f. Gyn., No. 23, 1906.

the bladder permanently drained. The patient had a mild attack of cystitis, but recovered. Holmes[1] reviewing the operation up to date, believes that it finds its principal indication in rigidity of the cervix, including the presence of scar tissue and carcinoma, and in some cases of cervical displacements. Zarate[2] performed vaginal Cesarean section upon a patient who had narrowing of the

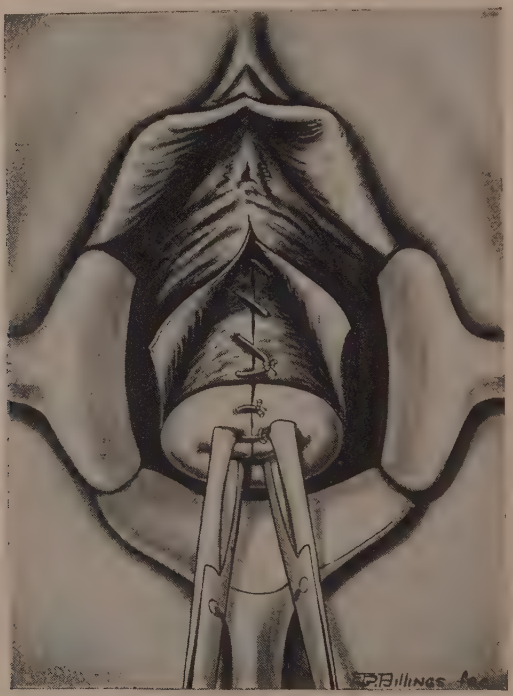

Fig. 184.—Vaginal Cesarean section: Suture of cervical incision completed (Peterson).

larynx from scar tissue, with consolidation of the right lower portion of the lung. The laryngeal lesion was syphilitic. The mother's breathing was immediately improved after the uterus was emptied, and she recovered and was able to nurse the child. During her convalescence an examination of the larynx showed characteristic lesions. Rotter[3] performed the operation and delivered the child in

[1] Surgery, Gynecology, and Obstetrics, December, 1906.
[2] Zentralblatt f. Gyn., No. 52, 1907.
[3] Ibid., No. 39, 1907.

five minutes in a multipara dying from mitral disease with edema of the lungs. The rapidity of the operation made it especially appropriate for such a case. In cases of eclampsia (unconscious) the operation was also performed without anesthesia.

The criticisms on vaginal Cesarean section have arisen largely from an unfortunate choice in selecting cases for the operation. Its

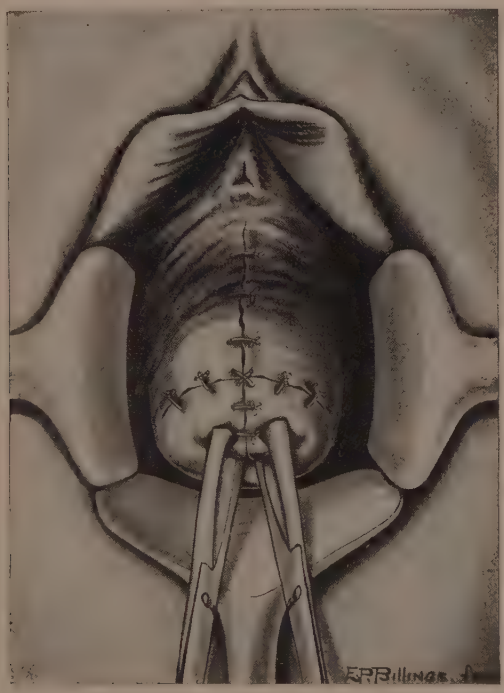

Fig. 185.—Vaginal Cesarean section: The vaginal mucosa can be united by continuous or interrupted suture. Care should be taken not to have too accurate coaptation, for fear of oozing under flap (Peterson).

field is limited, but at present it is useful in eclampsia, premature separation of the placenta, heart lesions, and other maternal diseases which may threaten immediate death during labor, and, rarely, in conditions threatening the fetus. The operation has been successfully performed for prolapse of the umbilical cord through a very resisting cervix.

Bibliography of Vaginal Cesarean Section

Benecke: Zentralblatt f. Gynäkologie, No. 23, 1906.
Bonnaire: La Presse méd., Nos. 66 and 67, 1909.
Bossi: Proceedings 16th International Congress, Budapest, 1909; Gyn. Rundschau, No. 23, 1909.
Büttner: Zentralblatt f. Gynäkologie, No. 29, p. 918, 1907.
Döderlein: Münchener m. Wochens., p. 963, 1907.
Dührssen: Transactions of American Gynecological Society, 1908; Gyn. Rundschau, Heft 22, 1908; Beiträge z. Geb., Band 14, 1909.
Friedmann: Gyn. Rundsch., p. 613, 1907.
Fry: American Journal of Obstetrics, February, 1909.
Fuchs: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 295, 1907; Zentralblatt f. Gynäkologie, No. 6, 1909.
Gauss: Proceedings 16th International Congress, Budapest, 1909.
Goffe: American Journal of Obstetrics, August, 1905.
Herz: Wiener med. Wochens., No. 5, 1907.
Holmes: Surgery, Gynecology, and Obstetrics, December, 1906.
Humpstone: American Journal of Obstetrics, January, 1909.
Keyserlingk: Zentralblatt f. Gynäkologie, No. 25, 1907.
Küstner: Zentralblatt f. Gynäkologie, No. 36, 1909; Monatsschrift f. Geburtshülfe und Gynäkologie, June, 1909.
Müller: Zentralblatt f. Gynäkologie, No. 11, 1907.
Nacke: Zentralblatt f. Gynäkologie, No. 6, 1909.
Nadory: Zentralblatt f. Gynäkologie, No. 39, 1907.
Neumann: Archiv f. Gynäkologie, Band 79, Heft 1, 1906.
Nijhoff: Zentralblatt f. Gynäkologie, No. 46, 1907.
Pape: Deutsche med. Wochenschrift, No. 39, 1907.
Peterson: Surgery, Gynecology, and Obstetrics, February, 1909.
Pfannenstiel: Münchener med. Wochenschrift, No. 19, 1909; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, p. 630, 1909.
Pforte: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, 1909.
Rotter: Zentralblatt f. Gynäkologie, Nos. 32 and 39, 1907, and No. 49, 1908.
Scheib: Zentralblatt f. Gynäkologie, p. 325, 1907.
Sinclair: Journal of Obstetrics and Gynecology of the British Empire, April, 1906.
Solms: Berliner klin. Wochenschrift, No. 5, 1909.
Spaeth: Zentralblatt f. Gynäkologie, No. 20, 1908.
Sprigg: American Journal of Obstetrics, October, 1909.
Staehler: Zentralblatt f. Gynäkologie, No. 48, 1907.
Walter: Hygiea, April, 1907.

Weisswanger: Zentralblatt f. Gynäkologie, No. 10, 1908.
Westphal: Zentralblatt f. Gynäkologie, No. 28, 1906.
Winter: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, 1907; Proceedings 16th International Congress, Budapest, 1909.
Zarate: Zentralblatt f. Gynäkologie, No. 52, 1907.

Incision Into the Pelvic Floor and Perineum

When it is evident that vaginal delivery must be attended by very severe laceration, such may be lessened or controlled by incising the perineum and pelvic floor. Some have advocated central incision, producing a central laceration of the perineum extending to the sphincter of the bowel. The majority would practice what is called "episiotomy," which incises the sphincter of the vagina, perineum, and pelvic floor.

This procedure must be done under anesthesia, and is best accomplished when the presenting part is pressing on the pelvic floor and when the perineum is drawn tensely against the fetus. If the patient is not to be anesthetized for delivery, she may be given partial anesthesia and a probe-pointed knife or pair of blunt-pointed scissors inserted between the presenting part and the perineum, between the junction of the upper third and lower two-thirds of the lateral surface of the posterior segment of the pelvic floor. During a pain the cutting edge of the knife or scissors blade may be turned against the tense tissue, and allowed to cut through obliquely down and outward. It is rarely necessary to make the incision more than 1 inch in length; sometimes two, ½ inch on each side, give better results.

Immediately following this incision the posterior segment of the pelvic floor moves downward and backward and the tissues gape asunder, leaving a triangular wound whose apex is directed upward toward the cervix, and whose base extends along the lateral wall of the birth-canal. Bleeding is rarely considerable after this incision, and if small vessels have opened, they should be tied with fine catgut. After delivery two lines of suture will be necessary to accurately close the incision: one upon the outer perineal surface and the other upon the inner vaginal surface. If the tissues have separated deeply, it is

well to insert buried stitches of catgut to bring the parts together accurately.

Complications rarely occur from these incisions, union is usually primary, and serious laceration of the pelvic floor and perineum is undoubtedly prevented by this means.

Delivery by Abdominal Section

Next to the introduction of antisepsis in obstetrics, the most important advance has been in the development of delivery by abdominal section. This has substituted certainty for uncertainty, shortened suffering greatly, robbed contracted pelvis of its terrors, given much better control of hemorrhage, and saved the lives and health of many mothers and children. The application of the principles of surgery to obstetric practice has been of as great value as the use of the same principles in general surgery or in various surgical specialties.

When a method of treatment becomes successful it is often misapplied, improperly used, and with bad results. Such has been the lot of delivery by abdominal section. It has been wrongly applied to cases neglected and maltreated during labor, where the patient's life had practically been lost before the operation was chosen. There is need to scrutinize the indications for abdominal delivery and to limit the operation to those conditions in which it is successful. If this be done the mortality and morbidity of difficult parturition will be greatly lessened.

Methods of Abdominal Delivery.—When the fetus is in the uterus and it is to be delivered by abdominal section, methods of treatment may be chosen in accordance with the decision to render the patient incapable of further procreation or to avoid disturbing this important function. The condition of the body of the womb is also a most important factor, for in the presence of extensive disease of the uterine muscle the womb must be removed, and the patient so rendered sterile.

CELIOHYSTEROTOMY

By this term is understood the opening of the abdomen, the opening of the uterus, the removal of its contents, and the closure of the abdomen and womb. The patient is left capable of further procreation and but little, if any, change is made in the condition of the uterus. This operation is most often performed and is most frequently termed what is popularly called "Cesarean section."

The Indications for Celiohysterotomy.—It cannot be too clearly understood that celiohysterotomy must be a primary operation.

Fig. 186.—Celiohysterotomy: The uterus turned out of the abdominal cavity. To distinguish the hands of the operator, they are covered by rubber gauntlets; the hands of the assistants are shown without them.

There must have been no previous attempt to deliver the mother, no frequent vaginal manipulations, no pre-existing septic condition of the birth-canal. Mother and child must be in good condition. The previous application of forceps, attempts at version, prolonged vaginal examinations, efforts to dilate the cervix, septic conditions in the vagina, the fetus exhausted by birth pressure, these are among the most important contraindications for celiohysterotomy. For the operation to be successful the surroundings must be favorable. Al-

though it is better to have the patient in a hospital, the operation can be successfully done in a private house which is in good sanitary condition. The operator must be familiar with obstetric surgery and must understand thoroughly the principles of the operation. He must have two, preferably three, competent assistants. If the operation is to proceed smoothly, there must be three experienced nurses. Spectators often think that celiohysterotomy is a very simple performance. This may be so when the operation is done by experienced

Fig. 187.—Celiohysterotomy: Incising the uterus.

persons with competent assistants, each of whom knows exactly his part in the operation. When these conditions are absent, celiohysterotomy is by no means simple or easy.

When the operator finds that the conditions which make the operation justifiable are present, he may consider the indications for its employment. That most frequently existing is disproportion between the mother and child or physiologic incompetence for labor; concerning these indications there is but little difference of opinion.

The application of the operation has been further extended to

central placenta prævia, eclampsia, and threatened occlusion of the umbilical cord. In deciding upon the operation it must be remembered that in many cases it is a child-saving operation; hence its best results will not be obtained unless the child is viable and in good condition.

The Technic of Celiohysterotomy.—The patient is placed upon her back upon a suitable table and the pelvis slightly raised. Care should be taken that the position of the patient's head is an easy one and that

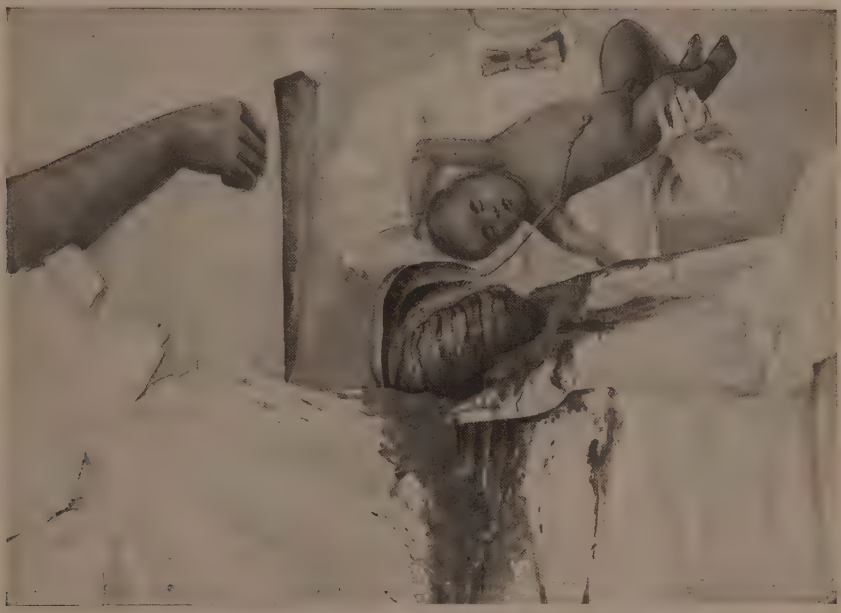

Fig. 188.—Celiohysterotomy: The delivery of the child. An assistant is controlling the hemorrhage by grasping the broad ligaments.

respiration is unimpeded. The bladder should be thoroughly emptied by catheter under anesthesia, just before the abdominal incision is made. In contracted pelves the bladder may be pinched between the presenting part and the pubes, and drawn upward into the abdominal cavity. The abdominal incision is made in the median line, at first just below the umbilicus. This enables the operator to avoid the bladder, ascertaining by his fingers its position. The abdominal wall is often very thin in pregnancy, and care must be taken lest

the incision pass through the abdominal wall and wound the uterus. The abdomen having been opened, and a careful examination made to ascertain the position of the bladder and intestines, the abdominal incision is then enlarged sufficiently to permit the removal of the uterus from the abdominal cavity.

The advantages of this procedure are: a more efficient control of uterine contraction, the better avoidance of contaminating the abdominal cavity with amniotic liquid and blood, and better access to the uterus for the application of sutures.

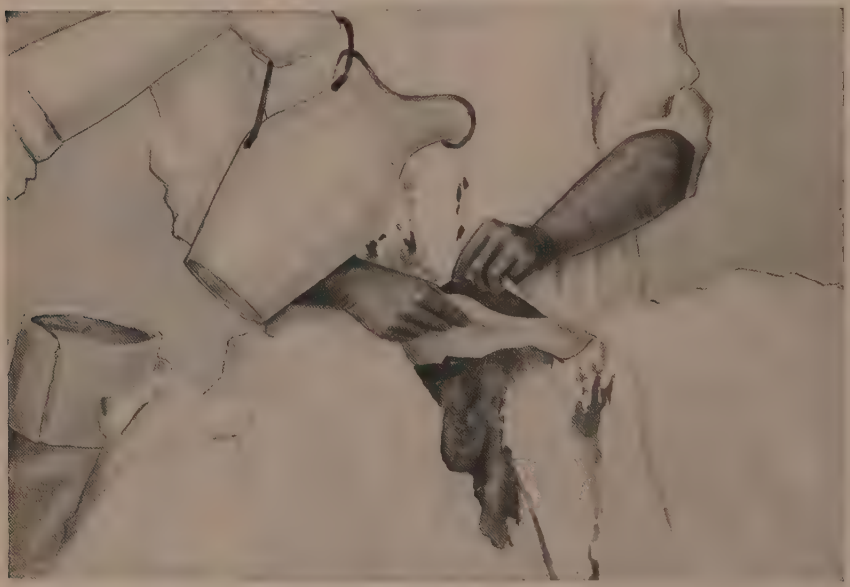

Fig. 189.—Celiohysterotomy: Pouring sterile salt solution through the recently emptied uterus.

The disadvantages are: the danger of abdominal incision, the greater disturbance of the abdominal viscera, and the greater tendency to escape of the intestines from the abdomen. In the opinion of the majority of operators the advantages of removing the uterus from the abdominal cavity outweigh the disadvantages, and this manipulation is commonly practised.

During the removal of the uterus from the abdomen considerable interference with respiration may arise because of the disturbance to

the abdominal viscera. The anesthetizer should be prepared for this, and should vary the quantity of ether used, and, if necessary, give appropriate stimulation. When the uterus is delivered, respiration is usually better, as the action of the diaphragm is less restricted. When the uterus is eviscerated, a large soft pad or towel, thoroughly sterilized and warm, should be placed over the intestines and the abdominal walls brought together as far as possible without suture. The uterus may rest upon the hot moist pads and abdominal wall.

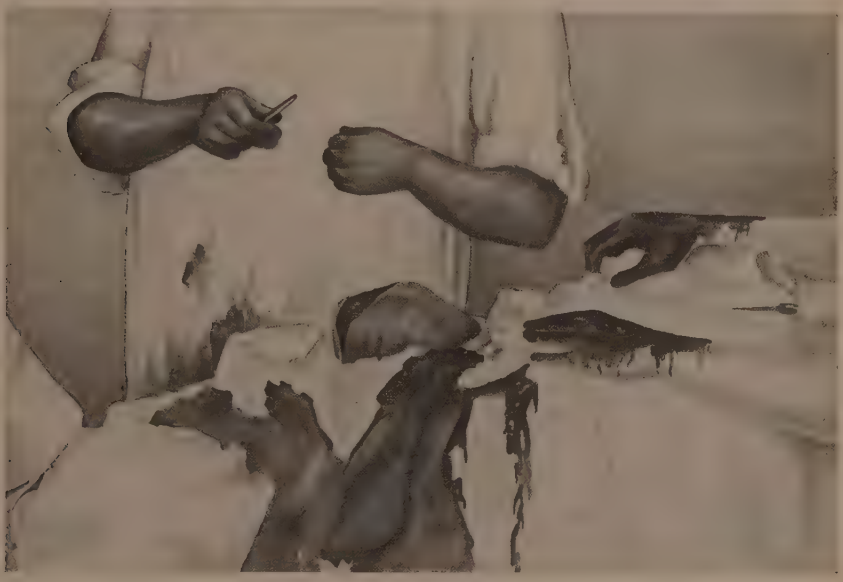

Fig. 190.—Celiohysterotomy: Closing the uterine incision.

To control hemorrhage from the uterus an assistant, preferably, grasps the broad ligaments with the thumb and fingers. If he is not experienced in this, he may simply grasp the lower uterine segment with both hands encircling the lower part of the womb, the ulnar border of the hands being pressed inward at the sides of the uterus. A firm grasp should be exercised and hemorrhage prevented by pressure upon the uterine arteries and their anastomoses.

When the uterus is ready for incision an assistant stands at the side of the operator with a sterile sheet or blanket in which to receive the child. The uterus is usually opened upon the anterior surface in

the median line by a longitudinal incision terminating about 1 inch below the fundus. Care should be taken not to open the uterus through the lower uterine segment. The operator should not make the incision the full length desired, because the uterine muscle will gape asunder as incised, and he may enlarge the incision slightly with the fingers before extracting the child

During delivery the uterus may be slightly enlarged by laceration. Should this be serious, it might be necessary to sacrifice the womb.

Fig. 191.—Celiohysterotomy: The uterus closed and contracted.

The operator can learn by experience only how to proportion the uterine incision to the condition of the uterine muscle and the probable size of the child. The uterus should be opened with very light strokes of the knife, and if the membranes have not been ruptured, the opening may be completed by the fingers. If unruptured, the membranes should be broken and the amniotic liquid allowed to escape upon sterile towels placed beneath the womb. The operator then grasps the nearest available portion of the fetus, usually the lower extremities, occasionally the hips, and delivers the child slowly and carefully, to avoid tearing the womb. It is held head downward and

the cord clamped twice and cut between the clamps. The child is then given to an assistant for further care.

Grasping the cord in the left hand, the operator then deliberately separates the placenta, removing placenta and membranes slowly and carefully. The uterus is also emptied of blood-clots. Hot sterile salt solution is then poured into the womb through the incision and allowed to run through the cervix into the vagina.

The uterine muscle is then closed by bringing together the muscle separately and reinforcing this with continuous suture of the uterine

Fig. 192.—Celiohysterotomy: The abdomen closed.

peritoneum. For the first is to to be preferred the best quality of silk, medium-sized, which has recently been sterilized by boiling. With a curved needle stitches are inserted $\frac{1}{8}$ inch from the border of the uterine incision beneath the peritoneal covering of the uterus, carried through the muscle, avoiding the lining membrane of the womb, and inserted upon the opposite side and brought out. Stitches should be tied immediately after insertion with moderate firmness. They should be placed sufficiently

close together to accurately and firmly close the uterine muscle. Should a large uterine sinus be evident in the incision and bleeding, an oblique stitch through the muscle may be inserted. Of the value of this precaution the writer can speak from experience. During the insertion of the muscular stitches the patient should receive a tonic dose of strychnin and ergot hypodermically given. If there is much bronchial irritation with catarrh, atropin should also be given hypodermically. Contraction of the uterus may also be

Fig. 193.—Celiohysterotomy: Applying the abdominal dressing.

expedited by enveloping it in a hot towel wrung out of sterile water, and massaging the uterus gently but rapidly. These measures have not failed so far, in the writer's experience, to secure uterine contraction.

When the muscular stitches have been inserted and tied, the uterine peritoneum should be closed with continuous suture of fine silk or No. 2 catgut, completely burying the muscular sutures. This suture should include not only the peritoneum, but subperitoneal and some muscular tissue. The edges of the peritoneum should be turned inward and brought together. This suture forms

a most efficient reinforcement to the uterine suture. The uterus, having been satisfactorily closed, is then replaced in the abdominal cavity in its normal position, and the intestines and omentum allowed to resume their normal positions. When it is certain that no foreign body has been left in the abdomen, a moderate quantity of sterile salt solution is introduced into the abdominal cavity and the abdominal wound closed. This is effected by bringing together separately the peritoneum with fine catgut or fine silk. In pregnancy the abdomen is often so distended that it may be impossible to distinguish the different layers of tissue in the abdominal wall. Where the abdomen is thin the suture which closes the peritoneum must include the muscular fascia of the abdomen as well. A good scar follows such suture, although it is not as exact as the method of suturing the different tissues separately. The skin is then brought together with interrupted silkworm-gut stitches.

The abdominal dressing after celiohysterotomy is of considerable importance. The incision is a long one, the abdominal walls have been overstretched and must undergo involution, and the abdominal wound might readily burst asunder if the patient were to cough or vomit violently. In addition to accurate suture a thoroughly secure dressing must be applied and maintained securely in position. It is furthermore desirable to make pressure on the solar plexus following the emptying of the uterus. This is necessary to maintain the tone of the abdominal viscera. We have had satisfactory results with a dressing applied as follows:

Above the fundus of the uterus a pad of sterile gauze, wide enough to extend across the abdomen and several inches thick, is placed. Over the incision sterile gauze is applied in several layers, and then the usual gauze and cotton pads, employed after abdominal section, are applied. Strips of rubber adhesive plaster, from 2 to 3 inches wide, are then placed over this dressing, making pressure from above downward. These should make firm but gentle pressure, the edges overlapping and forming one continuous occlusion bandage, which cannot be loosened by straining or coughing. Over this is

placed a many-tailed binder of flannel. In uncomplicated cases this dressing remains from ten days to two weeks without disturbance.

Complications Arising During Celiohysterotomy.—In operating for contracted pelvis, the obstetrician should not lose sight of the danger of wounding the bladder because of its high position in the abdomen. The writer has seen the bladder, although emptied by catheter, within an inch of the umbilicus in contracted pelves in highly deformed women; the intestine may be distended with gas at the time of operation, and a large portion of it may escape from the abdominal cavity. This, in our experience, has never caused serious trouble, and has not led us to alter our plan of operation. Amniotic liquid, in part, may escape into the abdominal cavity. This has happened but rarely in our experience and has produced no bad results. The uterus may show a disposition to remain relaxed, with more or less hemorrhage. As we have stated, we have seen no case in which this was not overcome by the hypodermic administration of strychnin and ergot, by pouring hot salt solution through the uterus, and by massage. As an added precaution we have several times tamponed the uterine cavity with 10 per cent. iodoform gauze, passing the gauze downward through the cervix into the vagina. This gauze should be removed in from forty-eight to seventy-two hours after the operation. Should the patient become partially conscious during the operation and struggle, she might cause tear of the uterine muscle at the moment when the child was delivered. If this tear was extensive, celiohysterectomy might be indicated.

Celiohysterotomy in Suspected Cases.—In cases which have been long in labor, and under circumstances where infection may readily have occurred, if the necessity for celiohysterotomy arises the operator must take unusual precautions to guard against the development of infection. The decision to save the uterus and the patient's power of procreation is often a very difficult one to make. If the membranes are unruptured at the time of operation the problem is much more simple, and unless the conditions under which the

patient has been during labor are unusually bad the effort should be made.

Before operation the vagina should be thoroughly irrigated with 1 per cent. lysol, the external parts thoroughly cleansed with tincture of green soap and hot water, and then with bichlorid solution (1:2000). Especial care must be exercised when the uterus is removed from the abdomen to protect the abdominal cavity by large pads wrung out of hot sterile salt solution. After the uterus has been emptied it should be thoroughly irrigated by pouring salt solution through it, and then the uterine cavity should be packed with 10 per cent. iodoform gauze, the end of which is carried through the cervix into the vagina. Before the abdomen has been closed a moderate quantity of salt solution should be poured into the abdominal cavity. The vagina should also be tamponed with bichlorid gauze.

If the membranes have long been ruptured before operation, and if the interior of the uterus is foul in odor and greenish in color, the Porro operation should be selected.

The gauze may be removed in forty-eight to sixty hours and the vagina sponged with cotton in bichlorid solution (1:4000).

The After-care of the Patient.—As soon as the operation is completed the patient should be drawn to the edge of the table, the external parts made thoroughly aseptic, and the vagina sponged out with cotton dipped in bichlorid solution (1:4000). Some clotted blood often remains in the vagina after operation, and this should be removed. No other vaginal manipulation or douching should be practised during the patient's recovery. The catheter should be employed every six hours, so long as necessary. If the patient had been in the hospital some time it would be unnecessary to move her bowels after the operation for forty-eight to seventy-two hours.

Many cases of delivery by abdominal section are performed upon patients who have had no suitable preparation, and all pregnant patients have a tendency to constipation, hence we have found it wiser, in the majority of cases, to purge the patient within forty-eight hours after delivery. Immediately after the operation the

patient should have, if necessary, a hypodermic injection of morphin ($\frac{1}{6}$ gr.). If atropin is needed it may be given. Sips of hot water, if the patient will take it, with 10 drops of aromatic spirits of ammonia, will usually be advantageous. If the patient vomits severely, the stomach should at once be thoroughly washed out. Should abdominal distention occur, a high irrigation of the bowel with hot salt solution should be practised The patient should not lie upon the side for the first twenty-four hours, but the limbs may be flexed and the patient made as comfortable as possible. If she complains of tightness in the bandage, the nurse may very slightly cut the border of the adhesive straps, taking care not to lessen it essentially, but to let the patient see that the endeavor is made. When the mother has thoroughly recovered from the operation she should nurse the child, at first once in eight hours or twelve, then every four hours.

When the patient has recovered from the anesthetic she may be given calomel in $\frac{1}{8}$-gr. doses hourly until eight have been taken. This should be combined with sodium bicarbonate and taken with water, or with albumen-water. From four to six hours after this has been finished, she may take a saline, followed by a high purgative enema. After the bowels have moved thoroughly she may take liquid food every three hours, gradually increasing as appetite returns.

The Care of the Child.—At the moment of delivery the child often shows a disinclination to breathe. This seems to be a physiologic apnea, possibly influenced somewhat by the anesthetic. Folding and unfolding the child head downward, its mouth and nostrils efficiently cleansed with antiseptic fluid, will usually cause it to breathe normally. We have, in our experience, seen no fetus fail to breathe which was in good condition at the time of operation. The child is usually vigorous, showing absence of birth pressure in the shape of the cranium. Until the mother's appetite returns and she can take food, the child may be fed with modified milk, with albumen-water, and small doses of brandy well diluted. If it has colic,

the intestines should be washed out. As the mother's ability to take nourishment increases, she should nurse the child more frequently. The operation does not interfere in the least with lactation, and mother and child usually do well.

General Care of the Mother.—At first strychnin in $\frac{1}{40}$-gr. doses is given hypodermically, every three to six hours, until the patient's bowels have moved thoroughly and she is able to take and retain food. Strychnin is then continued by the mouth for the first ten days. If there is much sleeplessness and pain, codein is given in $\frac{1}{2}$-gr. doses. Sterile vulvar dressings are worn by the patient, and after the first few days she may turn upon her sides as often as desired. In uncomplicated cases the dressings are changed two weeks after the operation and silkworm-gut stitches removed. A second set of adhesive straps are applied and allowed to remain for another ten days. These are then removed and a belt fitted, and three weeks after the operation the patient may sit up and gradually walk about. She can usually go to her home four weeks after section in good condition. Many operators discharge patients after section much sooner, but we have kept them under observation as long as possible in their interest, and because we wished to accurately study the results of the operation. In 95 cases we recall but one hernia, and this not an extensive one. These patients suffer no complications with the breasts, except those which may arise after any confinement.

Complications During the Puerperal Period.—Acute dilation of the stomach and intestines from pre-existing acute toxemia may result fatally. In these cases the patient vomits repeatedly and, in spite of treatment, the stomach and large intestine become so greatly distended as indirectly to bring about cessation of the heart's action. Hemorrhage may occur from the slipping or untying of a stitch in the uterine muscle. The patient may cough or vomit and burst open the abdominal incision. Where this occurred, a knuckle of intestine protruded, the peritoneum became infected, and sepsis resulted. Thrombosis and embolism are not common after celiohysterotomy. Pneumonia is not often observed, nor is acetonemia. Stitch-hole

abscess may develop in cases where efforts have been made to deliver before the operation, thus infecting the interior of the uterus. One of the writer's cases, a girl with highly contracted pelvis, did not wish to recover rapidly after the operation, because while well she was obliged to work. She smeared her fingers with lochial discharge, displaced her bandage, and infected several stitches of the abdominal wound. She accomplished her purpose, but ultimately made a good recovery. Septic infection may develop after celiohysterotomy from instruments, hands, sutures, sponges, and surroundings at the time of operation, from the Bacillus coli communis in the intestine of the patient, and from unknown sources. Thus the writer lost one case from infection of the peritoneum with the Bacillus proteus vulgaris. The source of this infection we could not determine, as suture material was found to be sterile, and the usual antiseptic precautions had been taken.

DELIVERY BY ABDOMINAL SECTION WITH STERILIZATION

It may, for many reasons, be desirable that the patient be not again exposed to the danger of childbirth.

Under these circumstances sterilization may be effected by one of several methods.

The excision of the uterine end of the Fallopian tubes, removing a considerable portion of the tube, is efficient. Ligation only of the Fallopian tubes has been found untrustworthy and has been abandoned. At the conclusion of celiohysterotomy a V-shaped incision may be made into the uterine cornu, removing not only the entire portion of the tube, but also a portion of the uterine wall at that point. The wound thus made should be closed by buried catgut stitches, and the peritoneum covering the uterus united above it. An inch of the Fallopian tube should be removed and the proximal end ligated securely. This procedure has given good results without complications. Menstruation continues, as the ovary is not interfered with, but impregnation is impossible.

CELIOHYSTERECTOMY WITH INTRAPELVIC TREATMENT OF THE STUMP

When, however, the body of the uterus is diseased, or ovaries or Fallopian tubes are abnormal, or it is desirable to end not only reproduction but menstruation, the removal of the ovaries, tubes, and body of the womb is indicated. There is nothing gained by dissecting out the cervix, as it serves a useful purpose in closing the vault of the vagina.

The Indications for Celiohysterectomy With Intraperitoneal Treatment of the Stump.—This operation is to be advised where it is desired to remove from the patient the body of the uterus, ovaries, and Fallopian tubes. If the patient be in a highly infected condition, the stump should not be dropped, but the body of the uterus should be removed and the stump treated outside the peritoneum. It may, in some of these cases, be possible to save the womb by performing suprasymphyseal section and draining the uterus through the abdominal wound with gauze. Celiohysterectomy with dropping of the stump is also indicated in patients where sterilization is demanded, and where the circumstances of the patient are such that she should be placed beyond the danger of disease of the pelvic organs. Thus, in women near the menopause, in the very poor who can least afford to be ill, in those deficiently developed mentally, who should not reproduce their kind and who are likely to be a charge upon the community, and in healthy married women who elect the operation to avoid impregnation and pelvic disease, the operation will give good results.

The Technic of the Operation.—The patient is prepared as usual for abdominal section and the vagina is also prepared for operation. But very slight dilation of the cervix is required, as there is little or no discharge through the stump after the operation. Hence, in multiparæ and in primiparæ where the cervix is softened and shortened the operator need not wait for labor.

The patient is placed upon her back with the pelvis slightly raised, the abdomen is opened, and the uterus delivered through the

abdomen, as in celiohysterotomy. After protecting the intestines with warm moist towels, the uterus is opened across the fundus, longitudinally or transversely, widely enough to permit the quick extraction of the child. After the delivery of the child it is usually convenient to deliver the placenta. Hemorrhage is controlled during delivery by pressure upon the vessels in the broad ligaments, as in celiohysterotomy.

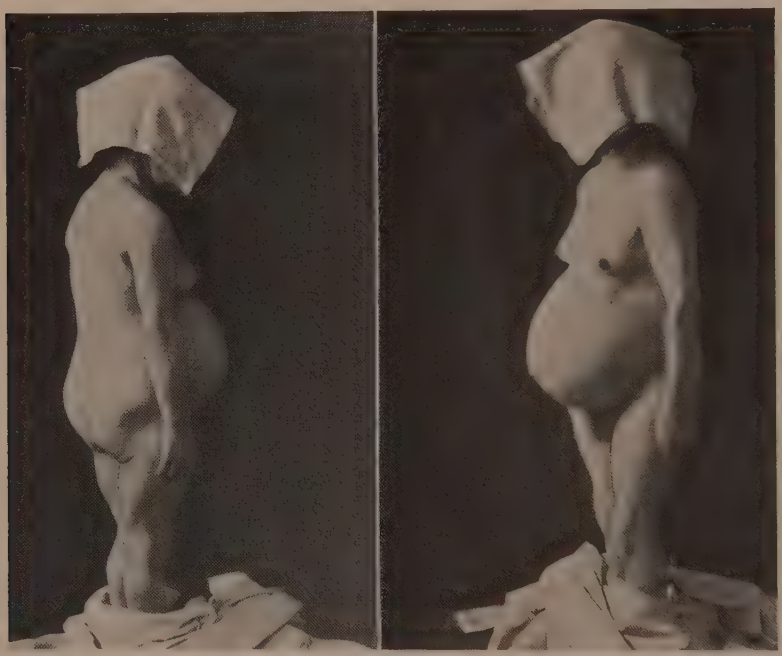

Fig. 194.—Poorly developed cretin dwarf delivered by celiohysterectomy.

The operator then begins upon one side of the pelvis and clamps the broad ligament along the side of the pelvis external to the ovary and tube. The broad ligament and ovarian arteries are then tied and the tissue in the grasp of the clamp severed from that which has been ligated. The round ligament and small vessels in its vicinity are similarly tied and the uterine arteries are sought and ligated. A slight incision is then made encircling the uterus through its peritoneal tissue at the lower uterine segment, when the peritoneal tissue is pushed downward. The uterus is then amputated through the

lower segment and bleeding vessels are caught and tied. If the uterine stump is of considerable thickness it is well to bring its surfaces together with buried stitches of catgut. Beginning at one

Fig. 195.—Infant born by celiohysterotomy; rachitic pelvis.

Fig. 196.—Flat pelvis; celiohysterotomy.

side, the peritoneal layers of the broad ligament are then brought together by continuous suture, covering the uterine stump with peritoneum, and passing completely across and around the pelvis. The pelvis is thus left with no tissues uncovered with peritoneum, hemor-

rhage is completely arrested, the bladder and rectum remain in normal position, and the remains of the broad ligaments hold the stump in place at the top of the vagina. The abdomen is closed without drainage, a pint of salt solution being left within the cavity. The ab-

Fig. 197. Fig. 198. Fig. 199.

Figs. 197, 198, and 199.—Achondroplasia. Repeated Cesarean section. First, celiohysterotomy; second, celiohysterectomy.

dominal dressing is the same as for celiohysterotomy and the after-treatment essentially the same. The duration of the operation is slightly longer than celiohysterotomy, but not sufficient to cause the patient danger. Patients bear both operations equally well.

The Puerperal Period After Celiohysterectomy.—The mother

nurses the child as well as if the uterus, tubes, and ovaries had not been removed. Lactation will proceed much longer than when the ovaries have been left and menstruation returns. In six months

Fig. 200. Fig. 201. Fig. 202.

Figs. 200, 201, and 202.—Rachitic pelvis. Celiohysterotomy, showing condition of the patient, with recovery.

or a year after the cessation of lactation the patient may be troubled by flashes of heat and some of the disturbances incident to the menopause. These however, usually subside without difficulty.

Complications of the Operation.—In experienced hands the operation is very satisfactory. With incompetent operators, one or both ureters have been tied or cut in the effort to ligate securely the uterine arteries. Occasionally necrosis of the stump occurs, and its mucous membrane and submucous tissue may come away with the discharge of mucopus through the vagina. Rarely a vessel of the broad ligament may be wounded and a hematoma may form. In one instance in the experience of the writer it was necessary to incise this and empty it through the vagina. This patient recovered.

The Results of Celiohysterectomy.—In the experience of the writer and other operators celiohysterectomy gives excellent results. Prolapse and hernia do not occur and the patient is left in excellent physical condition. For the child the operation is a life-saving one, and as it may be performed before labor the child is subjected to no birth pressure whatever.

CELIOHYSTERECTOMY WITH EXTRAPERITONEAL TREATMENT OF THE STUMP (PORRO'S OPERATION)

For fibroid uteri, and in pregnancy complicated with contracted pelvis, Porro performed hysterectomy followed by the suspension of the stump at the lower end of the abdominal incision, and the removal of the greater portion of its tissues by sloughing. In the light of modern technic the operation is objectionable, because the convalescence of the patient is much prolonged and because it leaves a sloughing mass upon the patient's abdomen. Practically, the operation is valuable in septic cases because it promptly removes the most severely infected portion of the birth-canal (the uterine body), it can be quickly performed, and its technic is better adapted to those not accustomed to abdominal surgery. Experience has shown that it is safer to leave a septic stump at the lower end of the abdominal incision than to drop it, although covered by peritoneum, into the pelvic cavity. Hence, undesirable as the operation may seem to be, technically speaking, it should still have a place in obstetric surgery.

Indications.—The indications for celiohysterectomy with extra-

peritoneal treatment of the stump are conditions rendering vaginal delivery dangerous in a woman whose uterus is severely infected. In cancer of the uterus the entire womb must be removed; in fibroid uterus it is better to leave the cervix, and in ruptured uterus it is usually best to leave the cervical stump to close the vagina. The Porro operation is selected to remove the infected body of the womb.

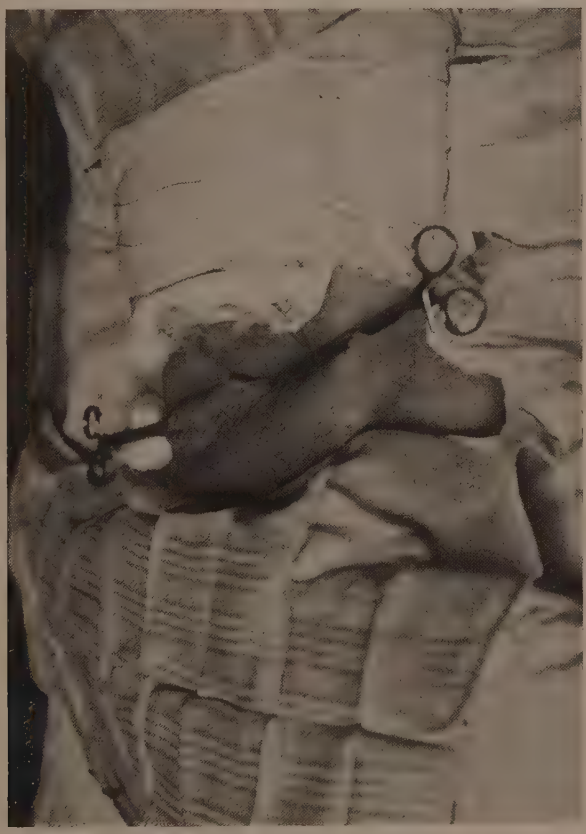

Fig. 203.—Porro operation: Clamps and stump in the lower end of the abdominal incision.

The Technic of the Operation.—After the womb has been emptied by abdominal section, if the operator has time he should ligate securely the ovarian and round ligament vessels. The broad ligament should be severed as far as the ligatures control hemorrhage. One or two clamps are then placed transversely across the lower uterine

segment, accurately grasping the entire width of the lower segment. They are securely fastened. These clamps will extend across the abdomen, holding the stump above the level of the abdominal surface. The tubes and ovaries are brought upward and removed with the body of the womb. The broad ligaments are closed so far as is neces-

Fig. 204.—Porro operation: Stump separated. Tissues healing.

sary, although but little tissue remains which is not in the grasp of the clamp. The uterus is amputated transversely above the clamp, and the stump is trimmed as accurately as possible to remove all superfluous tissue. The abdominal peritoneum is then accurately closed from above downward, and stitched to the peritoneal covering of the stump through its entire circumference, thus shutting off the

peritoneal cavity from the necrotic area in the stump. The skin is brought together with interrupted silkworm-gut stitches and the cut surfaces of the stump freely powdered. The handles of the clamps are then wrapped in gauze to support them on the patient's abdomen, and the cut surface of the stump is freely powdered with iodoform (10 per cent.), and boric acid. An abdominal dressing with adhesive strips is so applied that the lower portion can readily be opened to permit frequent dressing of the stump.

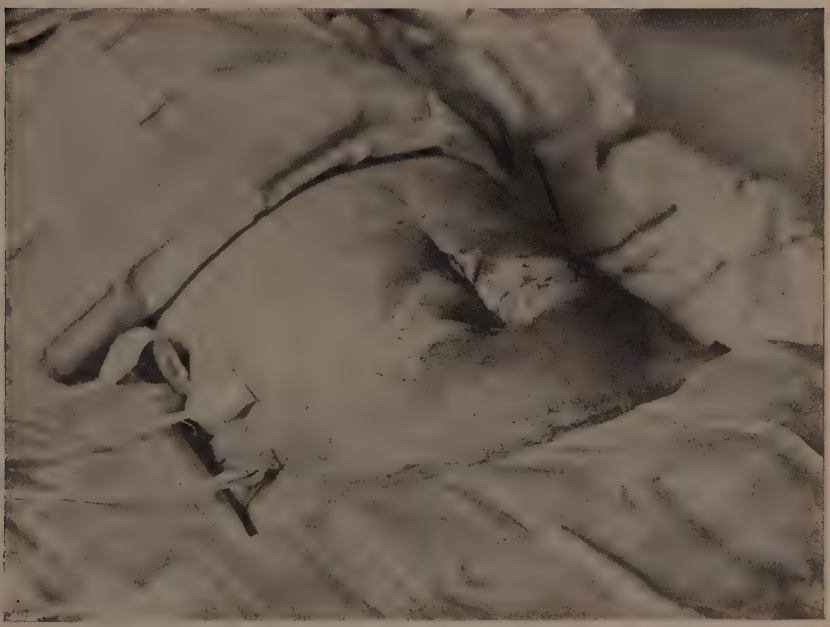

Fig. 205.—Porro operation: Stump separated. Tissues healed.

The Recovery from Celiohysterectomy with Extraperitoneal Treatment of the Stump (Porro's Operation).—The patient's recovery is retarded by the sloughing away of the tissue enclosed within the clamp. In two weeks the tissue is so softened that the clamps can usually be trimmed away with dull scissors.

There is a depressed healing surface, varying in size according to the size of the uterus. This does not suppurate, as a rule, and undergoes granulation and contraction if kept clean. Ultimately the

patient has a firm, tough scar, depressed somewhat below the surface

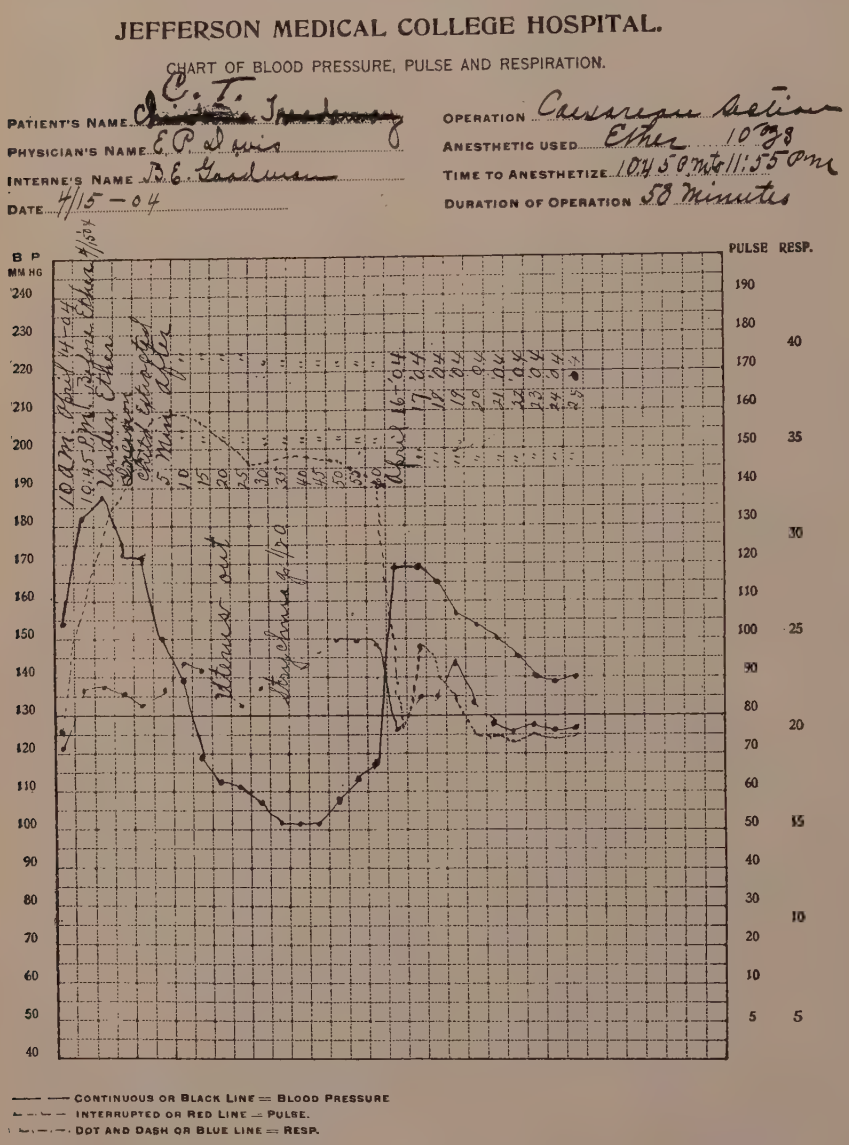
JEFFERSON MEDICAL COLLEGE HOSPITAL.
CHART OF BLOOD PRESSURE, PULSE AND RESPIRATION.
PATIENT'S NAME C. T.
PHYSICIAN'S NAME E. P. Davis
INTERNE'S NAME D. E. Goodman
DATE 4/15-04
OPERATION Cæsarean Section
ANESTHETIC USED Ether 10 38
TIME TO ANESTHETIZE 10 45 A.M. to 11:55 A.M.
DURATION OF OPERATION 58 Minutes
B P MM HG
PULSE
RESP.
Continuous or Black Line = Blood Pressure
Interrupted or Red Line = Pulse.
Dot and Dash or Blue Line = Resp.

Fig. 206.—Chart of blood-pressure during Porro operation.

of the abdomen and firmly holding the cervical stump and the upper portion of the vagina. While the operation is somewhat unsatisfac-

tory, technically speaking, and should not be selected in clean cases, in infected cases, clinically it gives good results.

Complications of Celiohysterectomy with Extraperitoneal Treatment of the Stump (Porro's Operation).—In some of the early cases

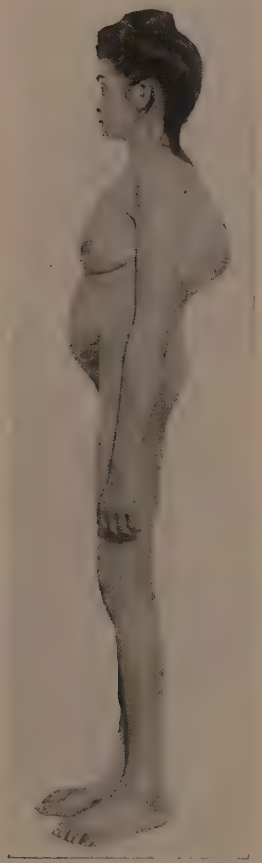

Fig. 207.—Porro operation: Patient with kyphotic pelvis.

Fig. 208.—Porro operation: Kyphotic pelvis, rear view.

Fig. 209.—Result of Porro operation: Kyphotic pelvis.

the patient died after this operation from hemorrhage, caused by slipping of the clamps, or through means employed to check hemorrhage. Porro first used two stout pins introduced at right angles through the stump, around which was drawn tightly a figure-eight ligature. Koeberle applied a loop of wire tightly around the stump,

compressing the stump by tightening the wire by a compression screw, and sustaining the stump by pins, transfixing it obliquely. But pins and rubber ligatures are inferior to properly constructed clamps, and Polk's vaginal hysterectomy clamps have given the writer good service.

Fig. 210.—Porro operation: Highly flattened pelvis, with paresis.

Fig. 211.—Porro operation: Highly flattened pelvis and obliquely contracted with hemiparesis.

The value of the Porro operation has been illustrated in the writer's experience, where, in 20 infected cases delivered by abdominal section, 12 have recovered. In these the Porro operation was performed, while in the others some other form of abdominal delivery was practised. In 1 case the patient, a primipara, had been several days in labor, and had been subjected by her attending physician to rupture of the membranes, attempt at forceps delivery,

attempted version, and attempted craniotomy with extraction. She was then brought on a railway train seventeen miles to the hospital. On opening the uterus its interior was green and gangrenous, the odor so stinking as to affect the hospital staff who were present. Between one and two years after the Porro operation the patient had gained 30 pounds in weight, was in excellent health, without disability of any kind, and had permanently been relieved of irritibility of the urinary bladder, which had been present since menstruation.

THE RESULTS OF DELIVERY BY ABDOMINAL SECTION IN THE WRITER'S EXPERIENCE

Up to the present time the writer has performed abdominal delivery by section in 95 cases. Of these, 85 have been done for pelvic contraction or unusual fetal size, one or the other, or both, constituting disproportion between mother and child, as shown by failure of the presenting part to engage after the test of labor. Of these patients 72 were uninfected and in good general condition at the time of labor. Among these, 1 died, the cause of death being peritoneal infection by the Bacillus proteus vulgaris. The exact mode of infection could not be demonstrated, as the uterine incision was healed and sterile, and the suture material employed was found to be sterile.

All of the children in these cases survived the operation in good condition.

20 cases were evidently infected at the time of labor, and among these, 8 died and 12 recovered. In those patients who recovered, the Porro operation was selected. Among the children in these cases, 4 died from inspiration pneumonia and birth pressure, and 6 were dead at the time of operation.

Delivery by abdominal section was also practised for the following unusual conditions:

Small multiple fibromata of the uterus, causing failure of uterine contractions, in 1 case; presentation of the parietal bone, with pro-

lapse of the hand and arm, in 1 case; central placenta prævia in 3 cases; enlarged thyroid with previous loss of children from thyroid toxemia in difficult labor in 1 case; enlarged thyroid and contracted pelvis in 1 case; contracted pelvis and twin pregnancy, with failure of uterine contractions, in 1 case; cretan dwarf with chronic toxemia in 1 case; tuberculosis of the hip-joint with malformed pelvis in 1 case. These causes were operative in producing a fatal result with those mothers who died. Septic infection in 5 cases; toxemia of pregnancy, with toxemic gangrenous pneumonia, in 1 case; acute tubercular pneumonia from an old focus in the hip-joint in 1 case; occlusion of the intestine fourteen days after operation with chronic toxemia in 1 case; double pneumonia with Friedländer's bacillus in a patient infected before operation in 1 case.

The mortality among the children resulted from polyhydramnios and monstrosity in 1 case; from prenatal hemorrhage from premature birth in 1 case; from inspiration pneumonia in 4 cases.

THE TREATMENT OF RUPTURE OF THE UTERUS

Rupture of the uterus usually occurs transversely across the anterior wall through the lower uterine segment. It results from disproportion, usually accompanied by vigorous efforts on the part of the womb to expel its contents. It may happen when the fetus is impacted, as in shoulder presentation, or in what is apparently a perfectly normal spontaneous parturition. The accident is followed by the cessation of labor-pains, by great tenderness upon abdominal palpation, with a rigid condition of the uterine muscle, with shock, evidence sometimes of hemorrhage, and beginning septic infection. The indications are, in the presence of this accident, to remove the fetus and uterine contents and to repair the rent in the uterus, or to remove the womb.

The Treatment of Uterine Rupture by Emptying the Womb and the Use of the Tampon.—Where the womb ruptures with the fetus in a favorable position for delivery, the rent not being large nor accompanied by much hemorrhage or shock, the fetus may be cautiously

extracted, and the patient treated by tamponing the uterus and inserting a tampon of 10 per cent. iodoform gauze through the laceration in the uterine muscle. This tampon should be left forty-eight to seventy-two hours and then removed. The vagina should be sponged out and not irrigated, and if the fingers of the operator can pass readily through the laceration, the gauze packing should again be applied. A second one is usually sufficient. This form of treatment is especially valuable because it can be almost immediately applied at the house of the patient, and comes within the scope of the general practitioner who has had some obstetric experience. Furthermore, statistics show that it is often not desirable to transport such patients to hospitals, because the moving adds to the shock under which the patient suffers and tends to produce a fatal issue.

When, however, a considerable portion of the womb is torn, there will be evidence of this from the severity of the shock, evidence of hemorrhage, and the contour of the fetus will be more plainly felt through the abdominal wall. Fetal death occurs almost invariably in uterine rupture, so the life of the fetus need not be regarded in the treatment.

Under these circumstances abdominal section should be performed. With this the uterus should be completely emptied, the fetus and as much blood-clot as possible removed from the abdominal cavity, and the uterus carefully examined to determine the possibility of retaining it. If the edges of the tear are clean, the tear of not very great extent, the large vessels not torn across, the patient being in fairly good condition, the operator may bring together the torn edges with buried catgut stitches, closing the peritoneal edges over with continuous catgut. The uterus should be packed with gauze, which is carried out through the cervix into the vagina. Salt solution should be introduced within the abdominal cavity and the abdomen closed. Usually drainage is unnecessary; occasionally a gauze drain may be passed to the bottom of the pelvic cavity.

Hysterectomy or total extirpation of the uterus is, however, the safer operation when extensive laceration has occurred. Usually

supravaginal amputation in the form of celiohysterectomy, the tubes and ovaries being removed, is applicable in these cases. In infected patients, it may be better to perform complete extirpation of the uterus, draining the pelvic cavity with gauze.

The Results of Treatment in Rupture of the Uterus.—This accident is so serious that in many cases treatment is unavailing. Its success will depend upon the amount of hemorrhage which has occurred, the time which has elapsed before the patient is seen, and the prompt and skilful application of treatment.

TOTAL EXTIRPATION OF THE PREGNANT WOMB

The total extirpation of the pregnant womb is indicated for malignant disease, and may be selected where violent septic infection is present, the patient in fairly good condition. The blood-supply of the emptied uterus is controlled by ligation, the cervix separated from the vagina and bladder, and the womb entirely removed. Bleeding vessels are then ligated, and the flaps of peritoneal tissue are brought together, leaving a gauze drain in the vagina if the case has been infected. In severe cases, with the patient in bad condition, it is best not to attempt to suture the broad ligaments or peritoneal surfaces, but to pack the pelvis with iodoform gauze, which may be gradually removed from the vagina. Extirpation of the uterus exposes the patient to greater risk of hemorrhage than hysterectomy, and it is not so readily accomplished by an operator who has not had a large experience.

Bibliography of Abdominal Cesarean Section

Adenot: Zentralblatt f. Gynäkologie, No. 48, 1907.
Allen: American Journal of Obstetrics, February, 1909.
Andrews: Transactions Obstetrical Society of London, vol. 4, 1906.
Asch: Deutsche med. Wochens., p. 923, 1907.
Ballika: Zentralblatt f. Gynäkologie, No. 14, 1907.
Banasc: Zentralblatt f. Gynäkologie, No. 46, 1907.
Bauer: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 24, Heft 6, 1907.

Bland-Sutton: Transactions of the Obstetrical Society of London, p. 194, 1907.
Bogdanovics: Zentralblatt f. Gynäkologie, No. 12, 1909.
Bonnaire: La Presse méd., p. 633, 1907.
Boyd: American Journal of Obstetrics, August, 1909.
Brindeau: L'Obstétrique, No. 1, January, 1909.
Brink: Münchener med. Wochens., No. 37, p. 1824, 1907.
Brodhead: American Journal of Obstetrics, May, 1908.
Buist: British Medical Journal, April 17, 1909.
Cases by Russian Operators: Zentralblatt f. Gynäkologie, No. 48, 1907.
Couvelaire: Ann. de Gyn. et d'Obst., March, 1906.
Cowen: British Medical Journal, January 26, 1907.
Cramer: Deutsche med. Wochens., No. 51, 1907.
Crowell: Annals of Gynecology and Pediatrics, p. 368, 1907.
Das: Journal of Obstetrics and Gynecology of the British Empire, May, 1908.
Davis, A. B.: Bulletin of the Lying-in Hospital, New York, June, 1908.
Davis, E. P.: Surgery, Gynecology, and Obstetrics, November, 1906.
Dirner: Zentralblatt f. Gynäkologie, No. 14, 1907.
Discussion, American Gynecological Society: American Journal of Obstetrics, June, 1909.
Dobbert: Zentralblatt f. Gynäkologie, No. 11, 1909.
Döderlein: Münchener med. Wochens., p. 963, 1907.
Doléris: La Gyn., September, 1909.
Endelmann: Zentralblatt f. Gynäkologie, No. 11, 1908.
Everke: Zentralblatt f. Gynäkologie, No. 26, 1907.
Fruinsholz and Michel: Ann. de Gyn. et d'Obstét., January, 1907.
Fry: American Journal of the Medical Sciences, May, 1908.
Fuchs: Zentralblatt f. Gynäkologie, No. 6, 1909.
Gallatia: Zentralblatt f. Gynäkologie, No. 52, 1907.
Griesel: Zentralblatt f. Gynäkologie, No. 19, 1907.
Grimsdale: Journal of Obstetrics and Gynecology of the British Empire, May, 1909.
Gushee: Bulletin of the Lying-in Hospital, New York, No. 3, 1907.
Höeg: Hospitalstidende, p. 1217, 1907.
Igelsrud: Zentralblatt f. Gynäkologie, No. 48, 1907.
Jardine: British Medical Journal, September 19, 1908; Journal of Obstetrics and Gynecology of the British Empire, December, 1908.
Jardine, Zweifel, and others: British Medical Journal, September 19, 1908.
Jobestiansky: Jurn. akuscherstwa i shenskich bolesnei, November, 1907.

Kaiser: Charité-Annalen Jahrg., 28th, 1907.
Kallmorgen: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, 1907.
Kayser: Zentralblatt f. Gynäkologie, No. 48, 1907.
Kolomenkin: Zentralblatt f. Gynäkologie, No. 48, 1907.
Kouwer: Zentralblatt f. Gynäkologie, No. 46, 1907.
Küstner: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 3, 1908; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 4, p. 606, 1907, and Band 28, Heft 3, 1908; Zentralblatt f. Gynäkologie, No. 44, 1907.
Landon: Journal of Obstetrics and Gynecology of the British Empire, p. 273, 1907.
Lemossu: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 28, Heft 6, 1908.
Leopold: Archiv f. Gynäkologie, Band 81, Heft 3, 1907.
Lepage: Zentralblatt f. Gynäkologie, No. 19, 1907.
Leumousse: Thése de Paris, January, 1908.
Liepmann: Zentralblatt f. Gynäkologie, No. 11, 1907.
Lobenstine: American Journal of Obstetrics, October, 1908.
Lumblach: Hygiea, p. 714, 1907.
MacPherson: Bulletin of the Lying-in Hospital, New York, December, 1908.
Marbott: Annals of Gynecology and Pediatrics, p. 25, 1907.
Markoe: Proceedings International Congress, Lisbon, April, 1906.
Markoe and Davis: Annals of Gynecology and Pediatrics, p. 112, 1907.
Martin: Münchener med. Wochens., No. 22, 1906.
Mauschotta: La Presse med., p. 327, 1907.
Meyer: L'Obstétrique, No. 1, February, 1908.
Morse: Journal of the American Medical Association, No. 15, 1907.
Muratow: Zentralblatt f. Gynäkologie, No. 8, 1907.
Newell: Surgery, Gynecology, and Obstetrics, May, 1909.
Nijhoff: Nederl. tijdschr. v. Geneesk., Band 1, No. 21, 1907; Zentralblatt. f. Gynäkologie, No. 26, 1908.
Oui: Rev. de Gyn., p. 529, 1907.
Pinard: Rev. de Gyn., p. 531, 1907.
Polak and Warren: American Journal of Obstetrics, October, 1908.
Porter: Journal of American Medical Association, March 20, 1909.
Potocki: Ann. de Gyn. d'Obst., June, 1906.
Pottet: Bull. de la Soc. d'Obst. de Paris, No. 10, 1907.
Proust and Pottet: Revue. de Gyn., p. 535, 1907.
Reynolds: Surgery, Gynecology, and Obstetrics, March, 1907, and May, 1908.

Rode: Norsk. Majazin for laegevidenskaben, p. 1361, 1907.
Rodzewitz: Chirurgie, December, 1907.
Rotter: Zentralblatt f. Gynäkologie, No. 49, 1908.
Routh: Journal of Obstetrics and Gynecology of the British Empire, p. 384, November, 1907; January, February, 1911.
Saks: Gazeta. Lekarska, No. 36, 1907.
Scharpenack: Zentralblatt f. Gynäkologie, No. 23, 1907.
Schauta: Zentralblatt f. Gynäkologie, No. 14, 1908.
Schmidt: Zentralblatt f. Gynäkologie, No. 25, 1908.
Schneider: Münchener med. Wochens., No. 41, 1907.
Seuffert: Archiv f. Gynäkologie, Band 82, 1907.
Sieffart: Zentralblatt f. Gynäkologie, No. 31, 1907.
Sinclair: Journal of Obstetrics and Gynecology of the British Empire, November, 1907.
Sippel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, 1907.
Spencer: Journal of Obstetrics and Gynecology of the British Empire, December, 1908.
Stimonowitch: Zentralblatt f. Gynäkologie, No. 32, 1907.
Studdiford: American Journal of Obstetrics, September, 1909.
Vallenta: Zentralblatt f. Gynäkologie, No. 52, 1907.
Veit: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 1, 1907.
von Franqué: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 1, 1908.
von Guérard: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, p. 417, 1907.
Voren and Tixier: Lyon méd., March 31, 1907; Zentralblatt f. Gynäkologie, No. 26, 1908.
Wallace: Journal of Obstetrics and Gynecology of the British Empire, December, 1907.
Warren and Polak: American Journal of Obstetrics, October, 1908.
Wechsberg: Wiener klin. Wochens., 1906.
Weisswange: Zentralblatt f. Gynäkologie, No. 8, 1908.
Wrazidlo: Inaug.-Diss., Leipzig, 1906.
Wyder: Archiv f. Gynäkologie, Band 82, 1907.
Zacharias: Med. Klinik, Band 3, p. 82, 1907.

SUPRASYMPHYSEAL SECTION

The proposition to open the uterus above the pubis without opening the peritoneal sac is by no means recent. Among others who suggested this was Physick, quoted by Dewees in a System of Mid-

wifery, Philadelphia, 1826. Physick, Dewees, and Horner, in discussing the matter, believed that such an operation was possible, and proposed to make a horizontal section in the muscles of the abdominal wall above the pubis, separating the peritoneum from the bladder and incising the cervix and lower uterine segment. This operation has been recently revived by Frank, Latzko, and Sellheim, and by the latter is considered especially applicable to infected cases.

The Technic of the Operation.—The patient is prepared as usual for abdominal section, the shoulders are depressed and the pelvis considerably raised; the Trendelenburg posture with moderate elevation is required. Pfannenstiel's transverse abdominal incision is then made, extending broadly across the lower abdomen several inches above the pubes. The recti muscles are divided transversely several inches from their attachment. With the fingers covered with gloves or gauze, or with both, the operator works his way downward into the connective tissue in front of the abdominal peritoneum, pushes the bladder upward and forward over the pubes, and the peritoneal sac upward toward the diaphragm. The lower uterine segment containing the presenting part is then exposed. The uterus is opened longitudinally and, if possible, the fetus expelled by abdominal pressure. When this fails, the forceps or version may be employed. The placenta is expressed when the uterus is emptied, and the uterus tamponed with iodoform gauze, which is carried through the cervix. The uterine incision is then closed with continuous catgut and the peritoneal and muscular incisions are closed in like manner. Before the child is extracted the patient is lowered from the Trendelenburg posture to the horizontal position, as hemorrhage seems to be less frequent in this posture. If the uterus is infected, Sellheim's method of causing a permanent uterine fistula may be followed. This consists in uniting the edges of the wound in the abdomen with the edges of the uterine incision; the uterus is packed with gauze, which is brought out through the fistula thus made. This gauze is renewed during the puerperal period until the infection has subsided. The fistula is then allowed to close.

The Advantages of the Suprasymphyseal Method.—It is claimed by those who urge this method that it avoids the dangers of opening the peritoneal cavity, that it is attended with little hemorrhage and shock, that the child is speedily delivered, and in septic cases that it retains the uterus, while efficiently treating the septic condition. It leaves the patient usually with the uterus anteverted, sometimes slightly adherent to the abdominal wall, and the pelvic organs in good general condition.

The Disadvantages of the Suprasymphyseal Method.—The disadvantages consist in the liability of wounding the peritoneum, while the space available for delivery is often not sufficient for the passage of the child without severe stretching and tearing of the soft tissues. If an opening through the peritoneum occurs, it should be immediately closed by continuous catgut stitch. But even if this be promptly done, septic infection may have entered. The emptying of the uterus by this method is sometimes followed by shock and sudden hemorrhage, requiring the application of the gauze tampon to control it. Although the danger of wounding the bladder is not great, it is not entirely absent, and such an accident has happened. Some urge that the bladder be completely emptied before the operation, while others assert that this condition makes but little difference.

The Results of Suprasymphyseal Section.—Zweifel, in a paper read before the British Medical Association in 1908, reported 4 extraperitoneal hysterotomies with recoveries. One patient had fever before and after the operation, but recovered after the bursting of an abscess. He urges transverse incision, believing that it leaves a much stronger scar. The fact that Zweifel has performed 16 subcutaneous symphysiotomies with no maternal death, 52 open symphysiotomies with 3 deaths, 13 celiohysterotomies with a total death-rate in these operations for the mother of 5.3 per cent., makes his report of value in estimating the advantages of the operation.

Sellheim[1] prefers anesthesia with scopolamin-morphin. The pelvis is slightly raised, a transverse incision 15 to 20 cm. (6 to 8

[1] Zentralblatt f. Gynäkologie, No. 5, 1908.

inches) long is carried down to the fascia, and hemorrhage is completely checked by ligating the small vessels. The fascia is incised transversely, the flaps closed by stitches, and the recti muscles separated longitudinally. The peritoneal and subperitoneal tissue is then separated from the inferior surface of the recti muscles. To outline the bladder it is moderately distended with sterile salt solution. With blunt scissors and pledgets of gauze the operator separates the peritoneum from the bladder to the cervix. With the bladder pushed downward as far as possible, the cervix is opened in the median line, the incision carried upward into the uterus, and the child pressed downward and delivered. After removing the child the uterus is urged to contract spontaneously, bringing the placenta into the wound. It is then delivered, and the uterus and cervix tamponed with gauze.

After closing the incision with continuous catgut the pelvis is lowered, the bladder replaced, and a few buried catgut stitches used to restore the fascia to its usual position. The patient is kept as quiet as possible for a short time after the operation. The average time of operation is about forty minutes.

In Sellheim's experience, streptococcus infection of the entire wound occurred in 1 case, proving fatal. In 1 case abdominal Cesarean section had been once performed and the extraperitoneal section also proceeded successfully.

The reports of various operators show that, if necessary, version may be done through the uterine incision and the child thus delivered.

The Application of this Method to Septic Cases.—In cases where embryotomy is impossible by reason of the contracted condition of the pelvis, the effort has been made by Sellheim and others to deliver the fetus and retain the uterus by establishing drainage through a utero-abdominal fistula. The delivery of the child is effected in the manner described, and after the uterus is empty the edges of the uterine incision are united to the edges of the abdominal incision. The peritoneum is carefully examined for traces of injury, and if such

has occurred, it is immediately repaired with fine catgut. The uterus is tamponed with iodoform gauze, a portion of which is carried through the cervix if sufficient dilation be present. If not, the cervix is moderately dilated with solid dilators. The remainder of the gauze from the uterine cavity is brought out through the abdominal incision, thus establishing external abdominal drainage. The fistula is allowed to close gradually as the patient's temperature falls and convalescence is established.

Reifferscheid[1] reports 19 cases of suprasymphyseal or extraperitoneal section. The best results were obtained by using the Pfannenstiel transverse incision. Little attention was paid to the condition of the bladder, although usually it was thought best to inject from 100 to 150 cm. of sterile salt solution. If the bladder is distended it encroaches upon the field of operation, and if it is entirely empty it is difficult to find its edge. It is best to open the uterus by a longitudinal incision, as hemorrhage is less and a firmer scar is secured. Severe hemorrhage was found in but 1 of these cases, and to avoid this it is best to take ample time for the delivery of the placenta. It is important, after delivering the child, to place the patient in a horizontal position. Hemorrhage from the uterus is thus observed more readily and prevented. Ergot was administered to secure uterine contraction, and adrenalin was tried, but not found successful. In some cases it was necessary to tampon the uterus. In 1 case the uterus was inverted through the incision, but without serious result.

Of the 19 cases, 16 were operated upon for contracted pelvis. The results were so good that the suggestion was made that intraperitoneal Cesarean section may in future be limited to cases where a uterine tumor or other abdominal tumor is present as a complication, or where it is desired to render the patient sterile. In 1 case of placenta prævia the operation proved satisfactory; although the vessels in the lower uterine segment were well developed, and the placenta lay beneath the incision, there was no severe hemorrhage.

[1] Zentralblatt f. Gynäkolgie, No. 33, 1909.

After the removal of the placenta the uterus was thoroughly tamponed. The child became so anemic from loss of blood that it lived but a few hours. It was observed that the lower uterine segment was variously distended in these cases. Evidently the operation could be done before the patient had labor-pains, although it is more easily accomplished when the lower uterine segment is greatly stretched. Good results were obtained in cases not aseptic at the time of operation. In one patient suppuration in the wound occurred which did not prove serious. Should infection evidently be present, it would be well to pass a gauze drain from the uterus into the anterior vaginal vault, closing the upper wounds completely. Jahreiss,[1] Nacke,[2] Heinricius,[3] Eversmann,[4] Frank,[5] and Rubeska all report successful cases.

Latzko[6] gives priority to Jörg in 1806. Ritgen, in 1821, modified the original proposal, and Latzko recognizes Physick's proposed operation in 1824 as practically the modern operation of Sellheim. Thomas, in 1870, performed laparo-elytrotomy.

At present three methods are proposed for this operation: A transverse incision, which consists in incising the peritoneum transversely, stitching the flaps, and extracting the child, Frank's method; the extraperitoneal, by dissecting the bladder from its peritoneal connection; Sellheim's method, or Latzko's method, which consists in pushing aside the bladder from the uterus and opening the uterus longitudinally. The principal danger of the method consists in the possible infection of the connective tissue, and in wounds and injuries to the lower uterine segment.

Latzko collected 150 cases, with a general mortality of 7.3 per cent. The maternal mortality from infection was 5.4 per cent.; the fetal mortality was nil.

Jeanin[7] collected 148 cases from the literature of the subject. He illustrates his paper by drawings, showing the various steps of the

[1] Zentralblatt f. Gynäkologie, No. 33, 1909. [2] Ibid.
[3] Ibid. [4] Ibid. [5] Ibid.
[6] Wiener klin. Wochenschrift, No. 14, 1909.
[7] L'Obstétrique, No. 8, 1909.

operation. There were in the 148 cases, 8 maternal deaths from infection, 2 from eclampsia, and 1 from several causes. The maternal mortality was 7.45 per cent. The percentage of deaths from infection was 3.04 per cent.

His paper covers 42 cases not included in Latzko's table, which gives a collection in all of 190 cases, with a maternal mortality of 7.37 per cent. from all causes, and a maternal mortality by infection of 4.21 per cent. At present it may be asserted that the mortality of the operation will range from infection only between 4 and 5 per cent. The morbidity shown by these statistics is a high one—30.7 per cent., of which 25 per cent. occurred from infection, and the remainder from various causes. It is notable that in some of these cases the bladder was involved.

As regards the fetus, asphyxia was seen not infrequently, and the fetal mortality was estimated from all causes at 3.62 per cent. There seems to be no choice between the transperitoneal and extraperitoneal methods of performing the operation.

Lewis[1] reviews the literature, collecting 102 cases, with 9 maternal deaths, and 5 fetal deaths, with a maternal mortality of 8.8 per cent., and a fetal mortality of 8.6 per cent.

In uninfected cases it cannot as yet be proved that suprasymphyseal Cesarean section, with or without opening the peritoneal cavity, but opening the lower uterine segment, gives as good results as celiohysterotomy where the uterus is removed from the abdominal cavity and the incision made through the contractile portion of the womb. In suprasymphyseal section the portion of the womb selected for incision is rich in blood-vessels, easily torn, and often lies at some depth in the abdomen and is difficult of access. It has yet to be demonstrated that this method is superior in uninfected cases.

Its originators proposed it as a substitute for the Porro operation in infected cases, hoping thus to save the uterus. Its claim to acceptance upon this ground has yet to be established, although its advantages in suitable cases, where the condition of the tissues is such as to

[1] American Journal of Obstetrics, October, 1909.

render its performance comparatively easy, cannot be denied. So much can be done, however, by embryotomy in infected cases, draining the uterus afterward by gauze packing through the vagina, that the operator must be sure of his ground before abandoning this procedure for suprasymphyseal section. One cannot readily see its advantages in placenta prævia, where the placenta must inevitably be wounded during the opening of the uterus from its low attachment at the site of the uterine incision. Further experience is necessary before the exact value of the operation can be proved.

Bibliography of Suprasymphyseal Section.

Baumm: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 27, Heft 2, 1908.

Czyzewicz: Zentralblatt f. Gynäkologie, No. 25, 1908.

Discussion: Zentralblatt f. Gynäkologie, No. 29, 1909; Monatsschrift f. Geburtshülfe und Gynäkologie, June, 1909.

Döderlein: Zentralblatt f. Gynäkologie, No. 4, 1909; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 6, 1909; Münchener m. Wochenschrift, No. 32, 1909; La Presse méd., No. 83, 1909.

Dührssen: Berliner klin. Wochenschrift, No. 5, 1909.

Fraipont: L'Obstétrique, July, 1909.

Frank: Archiv f. Gynäkologie, Band 81, 1907; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 75, 1907; Proceedings, 16th International Congress, Budapest, 1909.

Franz: Zentralblatt f. Gynäkologie, No. 24, 1909.

Freund: Zentralblatt f. Gynäkologie, No. 16, 1909.

Fromme: Zentralblatt f. Gynäkologie, No. 17, 1908.

Fuchs: Zentralblatt f. Gynäkologie, No. 21, 1909.

Hammerschlag: Zentralblatt f. Gynäkologie, No. 50, 1908.

Holzapfel: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 2, 1908.

Hörmann: Versamml. deutsche Naturf. in Salzburg, No. 81, 1909.

Jahreiss: Zentralblatt f. Gynäkologie, No. 7, 1909.

Jeannin: L'Obstétrique, No. 8, 1909.

Kahn: Zentralblatt f. Gynäkologie, No. 50, 1908.

Kehrer: Beitr. z. Geb. u. Gyn., Band 14, 1909.

Kermauner: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, 1909.

Kramer: Journal of Obstetrics and Gynecology of the British Empire, December, 1908.

Kroemer: Münchener med. Wochens., No. 42, 1908.
Küstner: Zentralblatt f. Gynäkologie, No. 16, 1908; Münchener med. Wochenschrift, No. 34, 1909; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, 1909.
Latzko: Zentralblatt f. Gynäkologie, Nos. 8 and 22, 1909; Monatsschrift f. Geburtshülfe und Gynäkologie, Bands 29 und 30, 1909; Wiener klin. Wochenschrift, 1909.
Lewis: American Journal of Obstetrics, October, 1909.
Luchsinger: Zentralblatt f. Gynäkologie, No. 33, 1908.
Nürnberger: Zentralblatt f. Gynäkologie, No. 26, 1909.
Olshausen: Zentralblatt f. Gynäkologie, No. 43, 1909.
Pfannenstiel and others: Zentralblatt f. Gynäkologie, No. 25, 1909.
Puppel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 3, 1909.
Reifferscheidt: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, 1909; Zentralblatt f. Gynäkologie, No. 33, 1909.
Rubeska: Zentralblatt f. Gynäkologie, No. 33, 1909.
Runge: Archiv f. Gynäkologie, Band 89, 1909.
Schauta: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, 1909.
Scheffzek: Deutsche m. Wochenschrift, No. 32, 1909.
Sellheim: Zentralblatt f. Gynäkologie, Nos. 5 and 10, 1908; Beiträge z. Geb. u. Gyn., Bands 13 und 14, 1909; Zentralblatt f. Gynäkologie, No. 37, 1909; Berliner klin. Wochenschrift, Band 30, 1909; Gyn. Rundschau, Heft 16, 1909.
Sellheim and Frank: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 28, Heft 5, 1908.
Thorn: Proceedings, German Gynecological Society, June 27, 1909; Gyn. Rundschau, No. 8, 1909.
Uthmoller: Zentralblatt f. Gynäkologie, No. 45, 1908.
Veit: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, 1907, and Band 28, Heft 5, 1908; Münchener med. Wochens., p. 1610, 1907.
von Franqué: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 1, 1908.
Wiemer: Zentralblatt f. Gynäkologie, No. 39, 1908.

EXTRAPERITONEAL SECTION BY INGUINAL INCISION

Extraperitoneal section was described and practised, and repeated efforts have been made to empty the uterus without opening the peritoneum by incision through the lower lateral portion of the abdominal

wall, pushing up the peritoneal sac and incising the uterus through the cervix and vaginal junction.

In October, 1821, Ritgen operated by this method, with an unsuccessful result, probably produced by the application of poultices which brought about fatal postpartum hemorrhage. Physick and Horner, in 1825, made anatomic studies in this direction, which were never put into actual operation upon the living. In 1870 Thomas advocated operation by his method, which consisted in dilating the cervix with the hand, carrying the incision from the symphysis to the right anterior superior spine and downward to the peritoneum, which was separated and pushed upward. He then exposed the cervix and vagina and cut through the vaginal wall upon a sound introduced into the vagina and maintained in place by an assistant. The cervix was drawn through this wound into the external wound and by a blunt tractor or hook the fetus was then extracted. His first case was one of eclampsia terminating fatally for mother and child soon after operation.

He then operated successfully upon a young primipara with a highly contracted pelvis.

Skene, in 1876, reported 2 successful cases. In 1878 the American Gynecological Society pronounced the operation feasible, and it was designated "laparo-elytrotomy." In his monograph upon the history of extraperitoneal section, Nürnberger (Zur Geschichte des extraperitonealen Kaiserschnittes, Inaug. Diss., München, 1909) states that fourteen of these operations were reported by the following authors: Thomas, 2; Skene, 5; Gillette, 1; Hime, 1; Edis, 1; Duncan, 2; Jewett, 2—14 in all.

Of these, 7 mothers recovered and 7 died.

It is stated that the mortality of the children was 42 per cent., and that the bladder was wounded in 6 cases.

If these cases are critically analyzed, it is found that many of them were in a condition unfavorable for any major operation. The true mortality of the operation was not a high one.

In Ritgen's claim for priority, the name of Jörg must not be

omitted, as Jörg proposed and devised the operation first, which Ritgen afterward performed.

In 1881 Frank tried to improve upon Thomas' method by suturing the round ligaments to the abdominal wall, forming a tent of peritoneum to shut off the lower portion of the uterus from the abdominal cavity, and making the incision in the uterus as low as possible. This method proved too complicated for general use.

In 1907 Frank devised an operation by transverse incision above the pubis, opening the peritoneal cavity, detaching and stitching the vesico-uterine fold to the parietal peritoneum, incising the uterus transversely, and, if possible, allowing the fetus to be delivered spontaneously through the channel thus formed. In clean cases the wound was closed by catgut after the uterus had been emptied. In suspected cases the uterus was left open and drained by iodoform gauze passed through the vagina.

Frank had 13 cases, with no death. This method was then somewhat modified, and employed by Frommé and Veit. Following somewhat Frank's original plan, Sellheim and Latzko devised the methods which have recently been extensively employed.

Döderlein (Monatsschrift f. Gerburtshülfe und Gynäkologie, Band 33, Heft 1, 1911) has devised an operation which he has practised in 32 cases, which is essentially as follows: The patient is placed in practically the Trendelenburg posture and an incision made in the inguinal region along Poupart's ligament from the anterior superior spine to the symphysis. His operations have been performed upon the right side, but he sees no essential reason why the left side may not be chosen. Some of his earlier operations were begun by the Pfannenstiel transverse suprapubic incision, but he afterward abandoned that for the superficial and deep inguinal incision. The skin, superficial fascia, and external and internal oblique muscles are separated, it being found necessary to wound the muscular tissue but very little. It is not necessary to cut the rectus muscle. Should it be excessively wide, it can be pushed to one side. The lower border of the transversalis must often be separated. The epigastric vessels are then

exposed and are divided between double ligatures. The connective tissue is then separated readily by the finger, and access gained to the inferior portion of the uterus, and the parametrium exposed below

Fig. 212.—Position of the patient and incision for extraperitoneal lateral Cesarean section. The patient is placed with the pelvis raised as high as possible, and incision is made in the inguinal region, on the right or left side (Döderlein).

the peritoneum. In the middle line the lateral border of the urinary bladder is seen, and on the external aspect of the wound are the large vessels. The round ligament is visible, and in one case it was divided

between ligatures. It is usually possible to draw it aside. The ureter is not in the field of operation, and with ordinary care it should not be wounded. The peritoneum can be pushed out of the way, it is thought, far more easily in the lateral than in the median operation. In the former the peritoneum is so high that it does not present in the field of operation. The uterine wall is then severed from one to two fingers' breadth from the right lateral border of the urinary bladder and parallel with the edge of the bladder. The uterus is

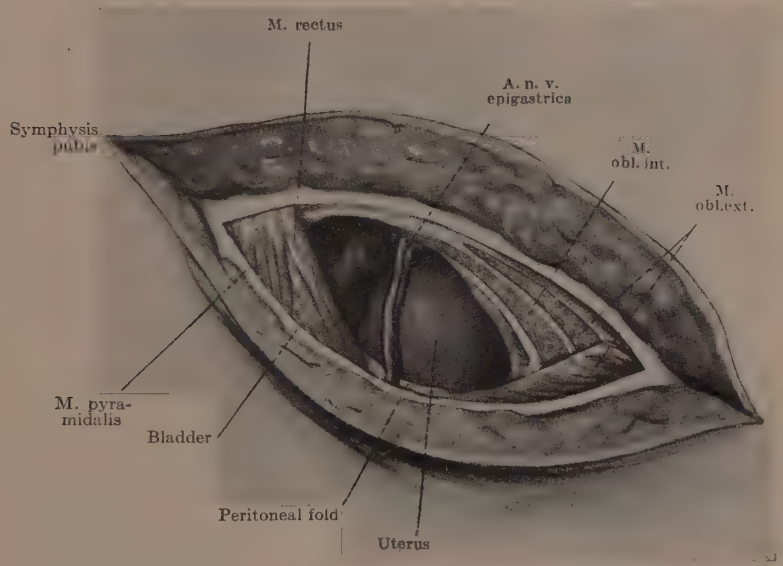

Fig. 213.—Anatomy of the tissues at the line of incision. The vessel crossing the wound is the epigastric vein. The urinary bladder is seen in the median line, and above it the lower uterine segment (Döderlein).

usually distended by the head, and it is not necessary to operate during uterine contractions to come readily upon the presenting part. The uterine wall at this point is found unusually thin and distended. The scalp of the child is also readily seen. In some cases with vessels of considerable size, apparently a large vein has occasioned some hemorrhage and has required ligation. In one case only did profuse hemorrhage occur. In this patient it was impossible to enlarge the wound sufficiently to deliver the child, and the wound was packed with

compresses, the abdomen opened, and the usual Cesarean section performed. Bleeding ceased when the uterus was emptied, and the patient made a good recovery. The bleeding was thought to come from varicose veins in the parametric tissue.

The child is delivered through the incision by forceps, the pelvis being lowered for the application. Care must be taken in delivery not to tear the uterus, and when the amniotic liquid has not escaped, the membranes may be ruptured and version immediately performed.

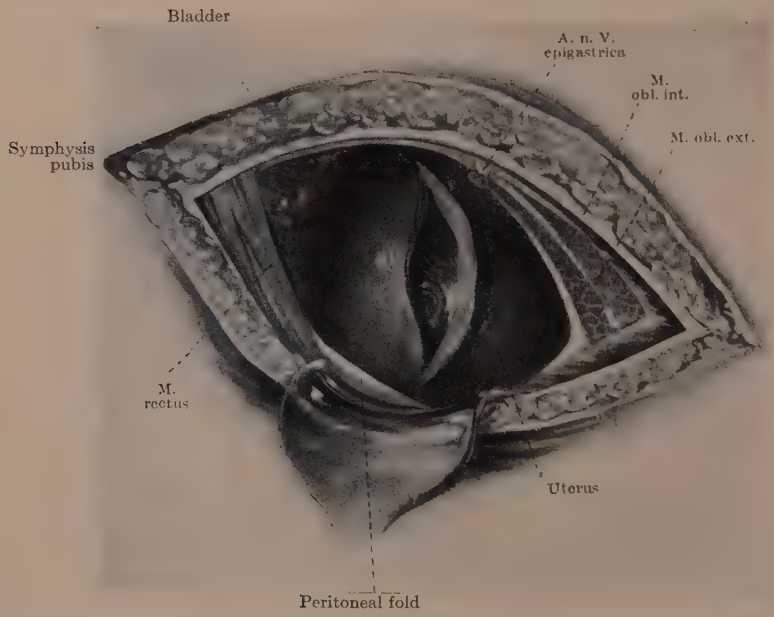

Fig. 214.—Opening the uterus parallel to the lateral border of the urinary bladder, the head of the child appearing in the wound (Döderlein).

If the child be large and extraction difficult, the wound may tear upward and the peritoneum be injured. This is not serious and can readily be repaired by suture. In no case did blood or amniotic liquid enter the peritoneal cavity.

After the delivery of the child, the pelvis of the patient is again raised, the placenta delivered, and the uterine cavity tamponed with gauze, which is carried through the cervix into the vagina. The edges of the wound are then seized with clamps and drawn upward,

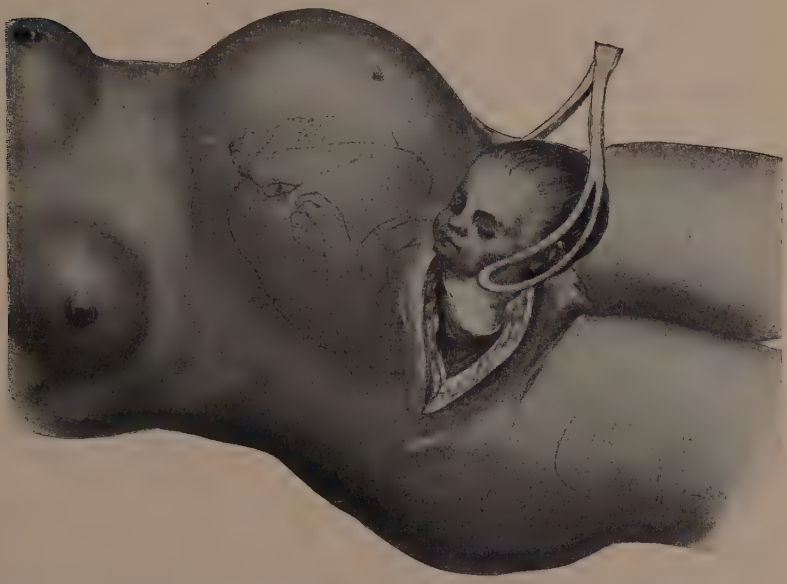

Fig. 215.—Delivery of the child by forceps after the uterus is opened. The patient is placed with the pelvis lowered (Döderlein).

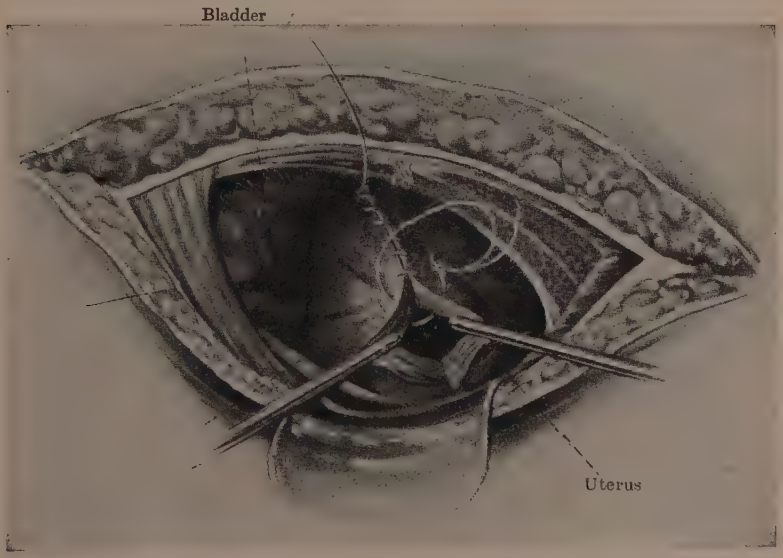

Fig. 216.—Closing the uterine incision with continuous catgut stitch. The edges of the wound are pulled strongly upward by the forceps (Döderlein).

and the wound thoroughly inspected and the bleeding points, if necessary, ligated. Should the cervix not be sufficiently opened, it can

readily be drawn upward and dilated or incised before or after the extraction of the child.

There is, however, no good reason for extensively opening the cervix, as only sufficient room for drainage is required. The uterine wound is then closed with continuous catgut in two layers, the superficial layer bringing together the connective tissue, and a strand of iodoform gauze is used to drain the connective tissue. The skin and fascia are united in the usual manner.

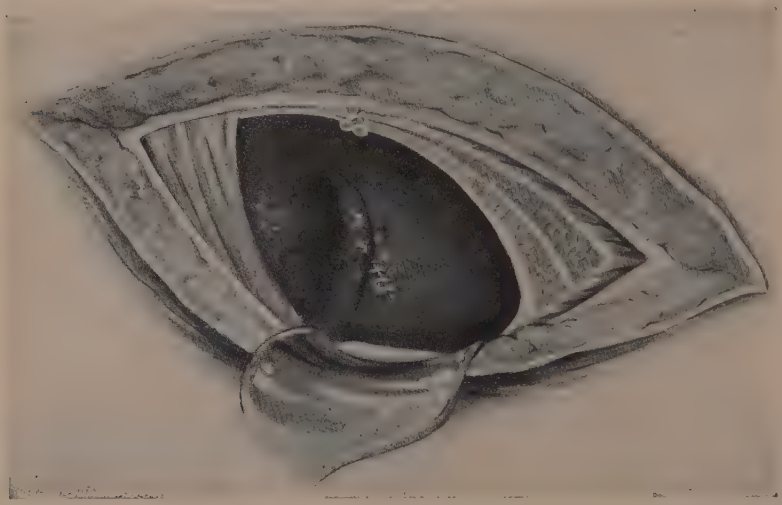

Fig. 217.—The wound in the uterus completely closed and the connective tissue between the bladder and uterus stitched over the uterine wound (Döderlein).

The suture of the uterus and connective tissue is so applied that the upper layer of sutures closes the connective tissue above the bladder over the greater portion of the uterine wound.

In Döderlein's 32 cases, 3 mothers and 2 children died; one mother died of eclampsia twelve hours after operation; the second had been four days in labor, and repeatedly examined, and the membranes had ruptured thirty-four hours before operation. There was a foul discharge from the uterus, and the patient had fever. The pelvis was highly contracted, and the child living. The mother died eight days after operation from septic infection, with suppuration in the connective tissue and gangrene of the bladder. The child had inspired

septic material and could not be resuscitated. The third mother died from paralysis of the intestine on the fourth day after operation. On section, no infection could be found, and no cause for the ileus.

In addition to the two children which could not be resuscitated, two died during the first week of life; 28 left the hospital in good condition.

Döderlein believes that this operation is technically more difficult than intraperitoneal section. The delivery of the child is not so easy as by intraperitoneal operation, and the mother's convalescence is more complicated.

Döderlein quotes 53 cases of hebostiotomy, with one maternal death from paralysis of the intestine.

Autopsy showed no injury to the abdominal tissues. In 321 cases of hebosteotomy recently reported he finds a maternal mortality of 1.8 per cent. He would reserve hebosteotomy for multiparæ with contracted pelves of the first and second grades. He would not perform this operation when the true conjugate was less than 7 cm.

Rupture of the Uterus

This serious accident complicating parturition requires surgical attention for the rescue of the mother.

Etiology.—Rupture of the uterus occurs in patients in whom the generative tract is but partially developed, in whom the uterine muscle has been weakened by repeated pregnancy and altered by infection or other disease, in patients having contracted pelves, in cases where an impossible presentation develops, and in patients in whom the uterus has been altered by some previous operation. The uterus may also be ruptured by unskilful and improper attempts at delivery, and is repeatedly torn into the pelvic or peritoneal cavities by unskilful rapid dilation.

Varieties of Rupture.—Most often the rupture is transverse on the anterior or posterior surface across the lower uterine segment. Less frequently it is oblique and ragged in outline. In lacerations or rupture complicating attempts at delivery, the tear extends

obliquely at the sides of the uterus, or may perforate the wall of the womb on the posterior aspect or at the fundus.

Signs and Symptoms.—The signs and symptoms of uterine rupture are, cessation of labor-pains, hemorrhage, vaginal or concealed, shock, often attended with severe abdominal pain, the death of the fetus,

Fig. 218.—Laceration of the lower part of the uterus and the vaginal vault. The uterus is turned over to the right to show the laceration (Kerr).

abnormal contour of the uterus, with the recognition of the fetus lying wholly or partially in the abdominal cavity.

The Natural History of Uterine Rupture.—In neglected cases the death of the fetus is accompanied by the escape of amniotic liquid into the abdominal cavity and the extravasation of blood, followed by the development of peritonitis. Infection speedily follows, and

if the patient does not die from hemorrhage and shock, she perishes from sepsis. In cases of slight rupture within the womb recovery may follow, but such is the rare exception and not the rule.

Fig. 219.—Rupture of the uterus. Fetus lying in the abdominal cavity: *a*, The anterior abdominal wall reflected; *b*, omentum; *c*, anterior surface of the uterus; *d*, the edge of the rent in the uterus. (A. Lionel Smith in Journal of Obstetrics and Gynecology of the British Empire.)

The Symptoms of Threatened Uterine Rupture.—Failure of the fetus to engage and descend into the pelvis, with excessively strong uterine contractions, excessive distention of the lower uterine segment, with distinct formation of a contraction-ring, and its gradual ascent, portend uterine rupture. It must be remembered, however,

that the accident may happen during spontaneous labor, in which the child has descended into the pelvic cavity and is about to be expelled, or has been spontaneously born.

The Prevention of Uterine Rupture.—The recognition of contracted pelvis, with measures suitable to deliver the patient in the most ad-

Fig. 220.—Photograph of uterus which ruptured spontaneously during labor: 1, Fundus drawn toward right; 2, 3, origin of right and left round ligaments; 4, infundibulopelvic ligament; 5, 6, right and left tube; 7, peritoneum separated from anterior uterine wall; 8, 9, peritoneum separated from uterus; 10, strip of cervix; 11, edge of rupture; 12, edge of incision; **, attachment to peritoneum; line 1, axis of uterine muscle; line *a–b*, axis of pelvic brim. (Sitzenfrey.)

vantageous way, are especially important in preventing rupture of the uterus. When the conditions are favorable for vaginal delivery the prompt removal of the child prevents uterine rupture. The correction of unfavorable presentation, the precaution to empty the

bladder of the patient sufficiently often, and to sustain her general strength, are also valuable aids in preventing the accident. Such measures as tend to bring the fetus favorably and promptly into the pelvic cavity will assist in avoiding uterine rupture.

The Treatment of the Accident.—Two methods of treatment are available in this complication, and the choice between them will depend upon the nature and extent of the rupture, the skill of the operator, and the circumstances in which the patient is placed.

When the head of the fetus is presenting and remains within the pelvic brim or pelvic cavity, rupture of the uterus is rarely so extensive as when the head escapes from the womb. The retention of the placenta within the uterus renders the accident less formidable. Under these conditions the obstetrician must empty the womb as speedily as possible, and then examine thoroughly, to determine the site, extent, and nature of the rupture. In such cases it is usually partial, not attended with great hemorrhage or shock, and may often be successfully treated without abdominal section. It must be taken for granted that some of the uterine contents have escaped into the surrounding tissues through the point of rupture.

To guard against infection drainage must be instituted, and this may be done by tamponing the womb with 10 per cent. iodoform gauze, and passing a strand of this gauze through the rupture in the uterine wall and into the surrounding tissues. If tonic doses of strychnin and ergot be given, and the uterus kept firmly contracted, the patient will often recover without further treatment. There is, however, risk of the development of infection, and the method is not as reliable as abdominal section, with inspection of the uterus and such other operative treatment as may be indicated.

Whether the obstetrician will treat the accident by tampon and drainage will depend not only upon the extent of the rupture, but upon the circumstances under which it occurs. If the patient is exhausted and somewhat shocked and cannot readily be taken to a hospital, and the operator must treat the case in her dwelling, it may be best to proceed with the tampon and gauze drainage. Such can be applied

with limited assistance, and with such aseptic technic as can be commanded in the ordinary dwelling.

If, however, the patient be in fair condition, a suitable hospital easily accessible, and the patient readily consents to operative treatment, she will do best to be transported to a hospital and subjected to operation.

Where the laceration is extensive, and a considerable part of the fetal body escapes into the pelvic or abdominal cavity, abdominal section offers the only chance for recovery. Delay increases the danger very greatly, and no time must be lost in transporting the patient to the hospital. Abdominal section should be done as soon as possible, and the operator prepared to close the rent into the uterus, or to perform hysterectomy, partial or total.

In preparing for operation, the patient should be made ready for intravenous saline transfusion, and appliances for stimulation should be at hand. She should be catheterized under ether, and the character of the urine noted. If it is bloody, it is possible that the bladder has been injured; and if no urine be obtained by catheter it is possible that the bladder has been torn sufficiently to permit the urine to escape into the pelvis or abdomen. In operating the obstetrician may require the Trendelenburg posture to examine thoroughly the tissues in the deeper portion of the pelvis.

The abdomen should be opened in the median line with a sufficient incision to permit the easy removal of the child, and give free access to the field of operation. The fetus should be removed as carefully as possible, so as not to increase the laceration or set up fresh hemorrhage. The cord should then be followed to the placenta, and if this is not entirely separated, it should be removed from the wall of the uterus and delivered. In extensive lacerations the placenta usually separates and is sometimes found in the abdominal cavity. The pelvis should be sponged with sterile sponges, and the extravasated blood and amniotic liquid removed as far as possible.

In cases of transverse rupture of the uterus an attempt to retain the womb by suture would rarely, if ever, be successful. Furthermore,

in these cases the danger of rupture of the womb in subsequent parturition would be very great. If, however, the tear is not extensive, and a portion of the fetus only has escaped from the uterus, an assistant should deliver the child through the vagina, or the operator may deliver the fetus by incising the uterus longitudinally in the median line, then closing the incision, and suturing the tissues at the site of the rupture. If the rupture has been extensive and the edges of the torn uterine muscle have retracted considerably, the attempted suture will be attended with great risk and will often end in disaster. Under such circumstances hysterectomy, with the removal of the Fallopian tubes and one or both ovaries, should be performed. If the patient be near the menopause, both ovaries may be removed to advantage; and if this be not the case, one ovary at least should be left. Where labor has been prolonged, and the attempts at delivery have been made through the vagina, the mucous membrane and the cervix at its cut edges should be cauterized with carbolic acid, followed by the application of alcohol. The cervical tissues should be closed with buried catgut stitches, and the edges of the broad ligaments should be brought together by continuous suture, and also the peritoneal edges, to cover the stump. The tubes may be dissected out and the uterine tissues at their internal extremity be brought together with catgut sutures.

If the obstetrician fears that septic infection has occurred, he should place a gauze drain at the bottom of the pelvis behind the stump, emerging at the lower end of the abdominal incision. The lowest stitch of this incision should be left untied; and the tissues brought together after the removal of the drain. In cases of extensive rupture the tear may extend laterally into the broad ligaments and it may be necessary to ligate the veins of the broad ligaments separately. Care should be taken to bring together the tissues accurately, and if the operator fears that subsequent hemorrhage may occur, he may place additional gauze where the hemorrhage is feared, removing it forty-eight hours after the operation. It is often best not to introduce salt solution into the abdominal cavity in these cases, as such solution

might spread infection from the pelvis among the intestines. Intravenous saline transfusion during operation will give better results.

In dealing with cases where the womb has been torn by unsuccessful attempts at delivery the lacerations will be through the lower uterine segment, as a rule, and may open into the vagina as well. Such injuries, if not extensive, may sometimes be repaired by suture, a gauze packing introduced behind the womb, and the effort made to retain the uterus. Where extensive laceration has occurred at the side of the uterus through the cervix, considerable extravasation of blood will often follow, and hematoma or hematocele may develop.

Should the case be infected before operation and the laceration be irregular in contour, and extending into the sides of the uterine tissue and into the pelvic tissues as well, the complete removal of the uterus is indicated. In these cases the torn vaginal and pelvic tissues may be brought together by suture and a gauze drain introduced and carried through into the vagina. The abdomen may then be closed from above, and the gauze removed through the vagina subsequently.

The Mortality and Morbidity of Uterine Rupture.—Among recent papers on the subject, Lobenstine [1] collected 37 cases in 41,800 labors. The accident happened more frequently in multigravidæ. Internal podalic version in the presence of uterine contraction is a frequent cause, and pelvic contraction has long been recognized as the most frequent complication leading to the accident.

In the 37 cases of complete rupture quoted, the mortality was 73 per cent.; 23 were treated by hysterectomy, with a mortality of 60 per cent.; 14 by packing, with a mortality of 92 per cent.

Eversmann [2] reports 140 cases, of whom more than one-half recovered; 45.8 per cent. died; 2 of these deaths were caused by gangrene of the intestine, resulting from pressure. When cases were selected for abdominal section the mortality was 42.8 per cent.; when abdominal section was done indiscriminately on all cases, the mortality of

[1] Bulletin of the Lying-in Hospital of the City of New York, March, 1907.
[2] Archiv f. Gynäkologie, Band 76, Heft 3, 1905.

those so treated was considerably over 50 per cent.; death resulted from peritonitis in 57 per cent.; from bleeding in 43 per cent.

It is interesting to note that the mortality rate was lower in the homes of patients than in cases transported to hospital; 29 per cent. more patients recovered without transportation. When, however, the patient was promptly removed to the hospital as soon as the accident happened, before the child was removed, the mortality was increased 8.1 per cent. Eversmann has found that 85 per cent. of cases could be successfully treated by the tampon, and that 15 per cent. demanded abdominal section.

The cases operated upon by vaginal hysterectomy gave 44 per cent. of recovery; abdominal hysterectomy, 46 per cent. of recovery; abdominal extirpation gave 46 per cent. of recovery; and suture of the uterine muscle through the abdomen 53 per cent. of recoveries.

In 13 cases observed by Kerr,[1] 2 died without operation; 3 cases of incomplete rupture were successfully treated by the use of the tampon; the Porro operation was unsuccessfully performed in 1 case; in 5 celiohysterectomy gave 2 recoveries and 3 deaths; and in 3 the uterus was extirpated, with 1 recovery and 2 deaths.

Schütte[2] in 14 cases—8 complete and 6 incomplete—had 3 deaths, 1 from complete rupture and 2 from incomplete. He has seen the best results from abdominal section followed by extirpation of the uterus, with vaginal drainage.

Scipiades,[3] in 97 cases, found the mortality 65.8 per cent. He considers it essential that the patients be disturbed as little as possible in transportation. In competent hands there seemed very little difference between the conservative treatment with the tampon and operation.

The Recent Bibliography of Rupture of the Uterus

Albeck: Ugeskrift für Laeger, p. 1030, 1907.
Blumreich: Berliner klin. Wochenschrift, No. 28, p. 890, 1907.

[1] British Medical Journal, August 24, 1907.
[2] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 2, 1907.
[3] Zentralblatt f. Gynäkologie, No. 26, 1907.

Brodhead and Brikner: American Journal of Obstetrics, December, 1909.
Brown: Journal of American Medical Association, October 24, 1908.
Cohn: Zentralblatt f. Gynäkologie, p. 327, 1907.
Conrad: Zentralblatt f. Gynäkologie, p. 24, 1907.
Couvelaire: Zentralblatt f. Gynäkologie, No. 48, 1907.
Cripps: British Medical Journal, June 2, 1906.
Donaldson: Surgery, Gynecology, and Obstetrics, April, 1908.
Eden: Journal of Obstetrics and Gynecology of the British Empire, June, 1909.
Ehrendorfer: Archiv f. Gynäkologie, Band 86, Heft 2, 1908.
Eisenstein: Zentralblatt f. Gynäkologie, No. 27, 1908.
Elliot: British Medical Journal, March 7, 1908.
Everke: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 261, 1907; Zentralblatt f. Gynäkologie, No. 26, 1907.
Falk: Zentralblatt f. Gynäkologie, No. 41, 1909.
Franz: Zentralblatt f. Gynäkologie, No. 18, 1908.
Freidberg: St. Petersburg Med. Wochenschrift, Band 32, p. 157, 1907.
Freund: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 65, p, 735, 1909.
Häfner: Inaug.-Diss., Breslau, 1910.
Hartmann: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 62, Heft 3, 1908.
Holm: Gyn. Rundsch., Band 1, p. 585, 1907.
Jolly: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 60, Heft 3, 1907; Zentralblatt f. Gynäkologie, No. 49, 1907.
Karnicki: Prezegl. lekarski, No. 37, 1907.
Lea: Journal of Obstetrics and Gynecology of the British Empire, December, 1904, and October, 1909.
Ledomsky: Journal of Obstetrics and Gynecology, St. Petersburg, January and February, 1909.
Leverich: Orvosi Hetilap, No. 52, 1907.
Lobenstine: American Journal of Obstetrics, November, 1909.
Mulert: Deutsche med. Wochenschrift, No. 37, 1907.
Petrén: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 3 and 4, 1909.
Potocki: Ann. de Gyn. et d'Obstét., June, 1906.
Puech: Zentralblatt f. Gynäkologie, p. 323, 1907.
Salms: Zentralblatt f. Gynäkologie, No. 34, 1909.
Sandberg: Inaug.-Diss., Freiburg, 1909.
Schütte: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, June, 1909.

Scipiades: Zentralblatt f. Gynäkologie, Nos. 13 and 40, 1909.
Sitzenfrey: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, Heft 1, 1909.
Small: American Journal of Obstetrics, vol. 55, p. 653, 1907.
Smith: Journal of Obstetrics and Gynecology of the British Empire, No. 6, June, 1909.
Stutz: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 257, 1907.
Tissier and David: Zentralblatt f. Gynäkologie, No. 45, 1907.
Valery: Inaug.-Dissert., Paris, 1905.
Walthard: Verh. d. deutsch. Ges. f. Gyn., Band 12, p. 626, 1907.
Weber: Beitr. Z. Geb. u. Gyn., Band 15, p. 53, 1909.
Westermark: Hygiea, p. 768, 1907.
Zangemeister: Münchener med. Wochenschrift, No. 27, p. 1344, 1907; Zentralblatt f. Gynakologie, No. 32, 1907.

Inversion of the Uterus

As the name indicates, this accident consists in the prolapse of the uterine fundus, the turning in of the uterine body, and the descent into the vagina or through the vulva of the uterus inverted, dragging with it into the pelvic cavity the tubes and ovaries.

Conditions Predisposing to Inversion of the Uterus.—Adhesions, scar tissue, and scars following operations about the cervix and lower uterine segment sometimes predispose to inversion. Chronic endometritis of the uterine decidua during pregnancy, with adhesion of the placenta, are potent factors in causing this accident. The relaxed condition of the muscular tissue of the uterus and exhaustion of the uterine muscle in long-continued or difficult labor predispose to its occurrence.

The Immediate Causes of Inversion of the Uterus.—Traction upon the wall of the uterus near the fundus is the most potent factor in producing this accident. Before Credé's method of expressing the placenta was introduced, and the placenta was frequently delivered by pulling upon the umbilical cord, inversion of the uterus was far more frequent. Failure of the placenta to separate normally, accompanied by traction upon the cord, readily brings about the accident.

The improper application of Credé's method in recent times has

frequently inverted the womb. If the obstetrician depresses or dimples the fundus of the uterus, and continues to press downward upon the fundus, inversion may often result.

Whether from traction upon the cord or dimpling of the fundus by pressure, the mechanism of uterine inversion is practically the same. Contraction and retraction of the uterine muscle being imperfect because the uterus is not completely emptied, the fundus is brought by traction or pressure downward toward the lower uterine segment. This manipulation excites contraction of the uterine expulsive segment, and sufficient pain is caused to produce bearing down and struggling on the part of the patient. An inverted uterine peristalsis results, and the fundus descends through the lower uterine segment and cervix.

Unless the fundus be promptly returned to its normal position, the contraction of the cervix may render the inversion permanent. The lower edge of the upper uterine segment will also contract, furnishing an additional obstacle to replacement.

Inversion of the Uterus Caused by Tumors Complicating Pregnancy.—Submucous fibroids complicating pregnancy may bring about inversion of the uterus after the delivery of the child. The relaxed condition of the cervix and lower uterine segment is favorable for this accident. During labor the fibroid becomes pedunculated and after the birth of the child descends into the uterine cavity. Its presence may excite uterine contraction, while the attachment of its pedicle to the fundus drags down the fundus and finally brings about inversion.

Signs and Symptoms of Uterine Inversion.—Shock and hemorrhage following the expulsion of the child may indicate inversion of the uterus. The absence of the uterus above the pubes, a tumor in the vagina or protruding from the vulva, and the persistence of shock and collapse indicate the accident. The placenta may remain adherent to the fundus of the uterus and disguise the presence of the fundus until a thorough examination is made. A pedunculated fibroid appearing at the vulva may conceal the presence of the fundus

just above. Mistakes have been made in diagnosticating the tumor, and the uterus has been removed, supposing that a fibroid presented or that the placenta was so adherent that it could not be removed.

The Results of Uterine Inversion.—If the patient's power of resistance be lessened by exhausting labor and anemia, the shock and hemorrhage accompanying inversion of the uterus may prove rapidly fatal. Infection may readily occur, especially at the placental site, and sepsis may turn the scale against the patient. Robust women survive inversion of the uterus, but health is impaired and the patient suffers from disability. The uterine mucous membrane becomes infected, the abnormal position of the ovaries causes pain and distress, the functions of the bladder are interfered with, the patient is unable to move freely, and her general health is greatly deranged. Should infection become severe, death from sepsis will follow.

The Prophylaxis of Uterine Inversion.—The obstetrician should make it his rule to avoid, under all circumstances, pulling upon the umbilical cord while the placenta is attached to the wall of the uterus. Long and exhausting labor should be terminated promptly and care should be taken that Credé's method of expression be applied by making pressure upon the anterior and posterior walls of the uterus without indenting the fundus.

Treatment.—In the presence of immediate inversion, the placenta, if attached, should first be removed. The uterus should be irrigated with 1 per cent. lysol, and the effort made with the closed gloved hand to indent the fundus and carry the womb upward to its accustomed position.

Complete anesthesia will be necessary. If the fundus can be indented sufficiently to permit one or two knuckles of the fist to be inserted, and if pressure be steadily made in the axis of the pelvis, the operator may hope for success. Some prefer to place a pad of gauze over the fist to avoid the danger of pressure upon the uterine mucous membrane. After replacement, the uterus should be irrigated with hot lysol solution and packed with gauze, and the vagina tamponed

also. Tonic doses of strychnin and ergot should be given to prevent relaxation and hemorrhage.

Where the uterus cannot be replaced, if the circumstances are favorable for maintaining asepsis, the operator may wait until the patient has recovered from the immediate shock of fatigue and labor, and may then, under anesthesia, make a further trial.

Where the uterus cannot be replaced and becomes infected during the puerperal period, its removal by vaginal section is indicated. If the conditions are favorable, the effort should be made to preserve one or both ovaries. If the tubes can be conveniently reached they should be removed. The pelvic cavity should be drained with gauze and the broad ligaments closed by continuous catgut suture.

In chronic inversion of the uterus various methods of treatment have been employed.

The effort has been made by persistent pressure to indent the fundus and thus restore the uterus to its normal condition. Pressure for some time with a hard-rubber ovoidal bulb has caused the uterine muscle to yield and brought about replacement.

Operative measures addressed to the relief of chronic inversion have endeavored to dilate or cut the contraction-ring, which prevents the ascent of the fundus and thus brings about its return to a normal position.

The choice of a method of treatment must depend largely upon the general condition of the patient, and especially upon the condition of the uterus and its lining membrane. If this be healthy, and infection be absent, operative treatment may be undertaken with hope of success. If, however, the uterus has become infected, or if it be the site of a foreign growth, vaginal hysterectomy is indicated.

In cases where inversion of the uterus has occurred, and the patient has been successfully operated upon with retention of the womb, subsequent labor may be followed by postpartum hemorrhage.

Born[1] successfully operated for chronic inversion, the patient

[1] Zentralblatt f. Gynäkologie, No. 4, 1907.

recovering, and chronic hemorrhage being succeeded by menstruation. Pregnancy occurred and went successfully to full term. The labor was rapid and spontaneous, but the separation of the placenta was followed by hemorrhage, from which the patient recovered.

Keilmann[1] reports a similar case, in which profuse hemorrhage occurred from partial separation of the placenta, which had been attached to the anterior uterine wall. The manual removal of the placenta was followed by cessation of the hemorrhage.

The Recent Bibliography of Inversion of the Uterus

Andrews: Transactions of the Obstetrical Society of London, vol. 48, 1906.
Barbour: Journal of Obstetrics and Gynecology of the British Empire, October, 1906.
Baseil: British Medical Journal, July 17, 1909.
Boissard: Bull. de la Soc. d'Obstét. de Paris, No. 10, p. 299, 1907.
Born: Zentralblatt f. Gynäkologie, No. 4, 1907.
Brammer: Montasschrift f. Geburtshülfe und Gynäkologie, Band 26, Heft 1, 1907.
Caché: Annal. de Gyn., October, 1907.
Clarkson: British Medical Journal, March 6, 1909.
Dighton: Journal of Obstetrics and Gynecology of the British Empire, October, 1905.
Ferguson: Journal of Obstetrics and Gynecology of the British Empire, October, 1906.
Fritsch: Zentralblatt f. Gynäkologie, No. 16, Band 31, p. 427, 1907.
Gross: Zentralblatt f. Gynäkologie, No. 46, 1907.
Guggisberg: Zentralblatt f. Gynäkologie, No. 3, 1909.
Hewson: Annals of Gynecology and Pediatrics, January, 1907.
Holthusen: British Medical Journal, January 23, 1909.
Holzapfel: Münchener med. Wochenschrift, Band 54, p. 1504, 1907.
Josephson: Zentralblatt f. Gynäkologie, No. 25, 1907.
Konietzny: Inaug.-Diss., Breslau, 1907.
Lichtenstein: Zentralblatt f. Gynäkologie, No. 43, 1907.
MacLean: Journal of Obstetrics and Gynecology of the British Empire, April, 1906.
Meriel: Annal. de Gyn., April, 1909.
Neugebauer: Zentralblatt f. Gynäkologie, No. 47, 1906.

[1] Zentralblatt f. Gynäkologie, No. 13, 1907.

Olmstedt: Journal of American Medical Association, vol. 48, No. 6, 1907.
Peterson: Surgery, Gynecology, and Obstetrics, August, 1907.
Pixis: Inaug.-Diss., Wurzburg, 1907.
Prüsmann: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 60, 1907.
Schönbeck: Zentralblatt f. Gynäkologie, No. 32, 1908.
Tate: Journal of Obstetrics and Gynecology of the British Empire, March, 1907.
von Herff: Zentralblatt f. Gynäkologie, Band 30, p. 425, 1907.

PART III

THE SURGERY OF THE PUERPERAL PERIOD

THE REMOVAL OF THE PLACENTA

The removal of the placenta by Credé's method is so successful in the majority of cases that the insertion of the hand into the uterus for this purpose is not often necessary. Circumstances may arise, however, which make it much safer to remove the placenta manually than to employ Credé's method.

Indications for Manual Removal of the Placenta.—Premature detachment of the placenta accompanying or immediately following the extraction of the fetus may give rise to active hemorrhage threatening the child and the mother as well. Credé's method may prove inefficient because sufficient time has not elapsed to permit the closing of the uterine sinuses and prepare the placenta for its expulsion. Under these circumstances its prompt removal, followed by tamponing the uterus with 10 per cent. iodoform gauze, will immediately check the hemorrhage. The hypodermic administration of strychnin and ergot will render the uterine contractions efficient and lasting.

In cases where difficult delivery, accompanied or immediately followed by considerable hemorrhage, has led the operator to fear that laceration of the lower uterine segment or, possibly, rupture of the uterus has occurred, the removal of the placenta manually is indicated to secure prompt uterine contraction and to permit the operator to examine the interior of the uterus manually. It can then be decided whether the threatening hemorrhage can be averted by the tampon,

or by sutures at the upper portion of the cervix, preceded by the tampon.

Wherever there is a reasonable suspicion that portions of the placenta remain behind, and the operator is working under competent aseptic precautions, the uterus should be explored and such fragments immediately removed.

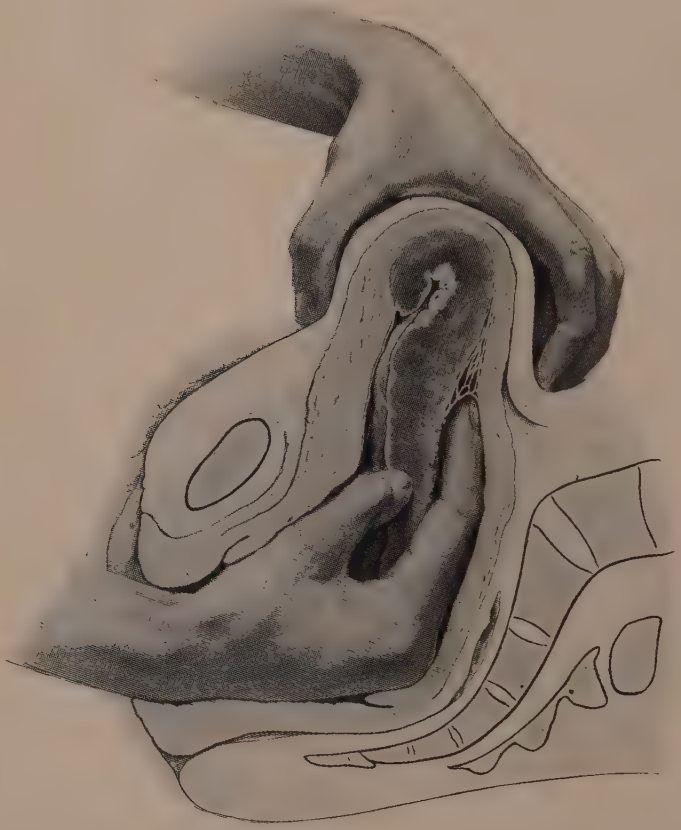

Fig. 221.—Manual removal of the placenta (Bumm).

Methods of Removing the Placenta.—The hand to be inserted within the uterus should have been prepared as for abdominal section and covered with a sterile rubber glove. The use of the obstetric gauntlet, reaching to the elbow, may be advantageous, but difficult to carry out. As a rule, an ordinary glove suffices, as the uterus may be pressed

down into the pelvic cavity, thus enabling the operator to reach the placenta without carrying the unguarded forearm within the cervix. The antiseptic preparation of the forearm, reaching above the elbow, is imperative in all obstetric manipulations. In introducing the hand the operator can usually recognize the fetal aspect of the placenta. This he will avoid, as he wishes to pass his fingers between the placenta and the uterine wall, as a paper-cutter is inserted between the leaves of a book. Finding the placental edge, he thus separates the placenta, passing the fingers gently until he feels that it has been entirely loosened. Then, grasping it in the hand and rotating it gently,

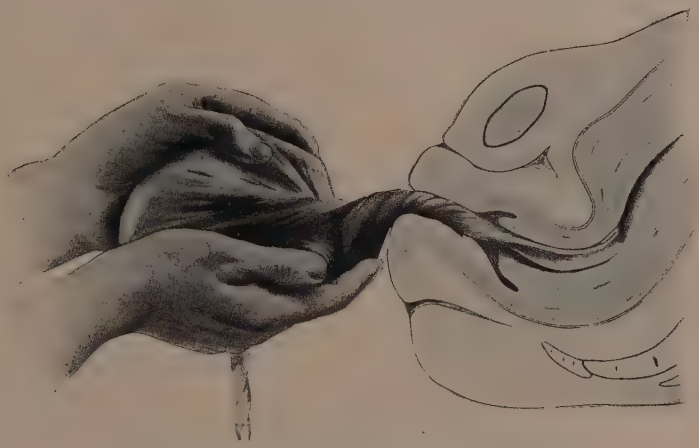

Fig. 222.—Delivering the membranes (Bumm).

he draws the placenta out, the membranes being twisted into the cord as they emerge. Retained blood-clot should be removed after the placenta has been delivered.

Precautions in Delivering the Placenta.—If the operator is hasty and unfamiliar with the anatomy of the placenta and uterus, he may remove only a portion, leaving a considerable part behind. Where the statement is made that the placenta has been completely adherent in a given case, it is more than probable that the operator failed to exercise patience in passing the fingers between the placenta and the uterine wall. In cases exhausted by hemorrhage or infected the fingers might be carried through the uterine wall, and hence the

finger-tips should be turned toward the placental substance as the separation proceeds. Should the operator find a foreign body within the uterus which he cannot recognize, after delivering the placenta, membranes and blood-clots, he can draw this gently down sufficiently far to inspect it. In cases of uterine rupture the intestine is often pro-

Fig. 223.—Manual removal of the placenta (Kerr).

lapsed into the uterus and has been pulled down and torn by efforts at placental delivery.

Delivery of the Placenta After Uterine Rupture.—In rupture of the uterus, should the child escape entirely into the abdominal cavity, a portion of the placenta may also be extruded. Here the introduc-

tion of the hand to deliver the placenta is especially valuable, as it enables the operator to locate and examine the rent and to make a satisfactory diagnosis.

The Delivery of the Placenta in Twin Labor.—Should it be necessary to deliver the placenta of the first fetus in twin labor, the operator

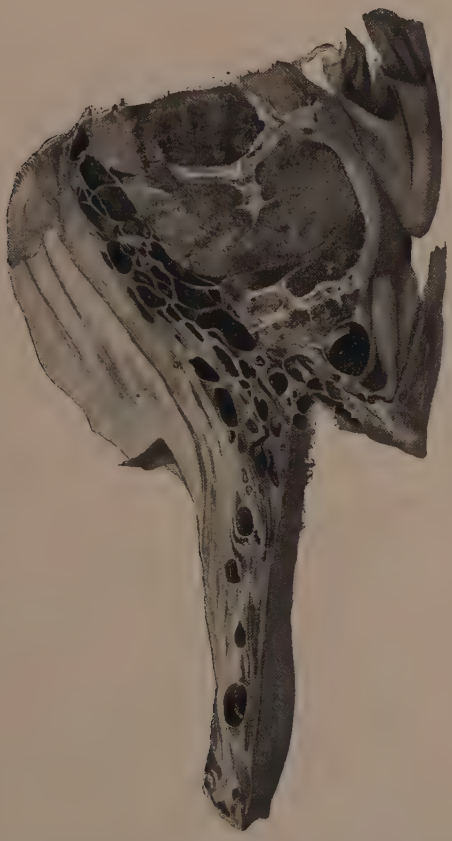

Fig. 224.—Showing portion of the uterine wall and attached placenta. The circular sinus is very distinctly seen. Drawing from a specimen in the Hunterian Museum, Glasgow University (Kerr).

should be careful not to disturb the second placenta, if they be separated. If there be one large placenta, delivery should not be undertaken until the second twin has been born. Especial care should be taken in these cases to separate the placentæ completely and to avoid

forcible manipulation, because the uterus is overdistended and may readily rupture.

Delivery of the Placenta by Pulling Upon the Umbilical Cord.—Under no circumstances should this procedure be adopted. It has caused inversion of the uterus with fatal results. In some cases the operator may grasp the cord with one hand, holding it as a guide to the introduction of the hand to the maternal surface of the placenta, but considerable traction upon the cord should not be made.

The removal of the placenta and retained blood-clot should invariably be followed by palpation of the uterus to determine the presence or absence of rupture. Should this be present, in whatever degree, the uterus should not be irrigated to control hemorrhage. The diagnosis of the existence and extent of uterine rupture can only be made by introducing the hand within the womb or by opening the abdomen.

Bibliography of Delivery of the Placenta

Adler: Monatsschrift f. Geburtshülfe und Gynäkologie, Band, 25, 1907.
Adler and Kraus: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 6, 1909.
Ahlfeld: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 64, 1909.
Beatus: Zentralblatt f. Gynäkologie, No. 47, 1907.
Burkhard: Zentralblatt f. Gynäkologie, No. 14, 1909.
Durlacher: Münchener med. Wochens., No. 8, 1907.
Gans: Gyn. Rundschau, p. 66, 1909.
Gauss: Hegar's Beitr. z. Geb. u. Gyn., Band 15, 1909.
Guënot: Zentralblatt f. Gynäkologie, p. 56, 1907.
Hartmann: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 65, 1909.
Herzfeld: Archiv f. Gynäkologie, Band 82, 1907.
Hofmann: American Journal of Obstetrics, p. 631, 1909.
Hofmeier: Berliner klin. Wochens., No. 12, 1907.
Höhne: Zentralblatt f. Gynäkologie, No. 10, 1909.
Ihm: Inaug.-Diss., Heidelberg, 1907.
Jacobson: Zentralblatt f. Gynäkologie, No. 33, 1907.
Kamann: Zentralblatt f. Gynäkologie, No. 26, 1907.
Krönig: Deutsche m. Wochenschrift, No. 46, 1909.
Labhardt: Proceedings German Gynecological Society, vol. 13, 1909.
Leo: Münchener m. Wochenschrift, No. 31, 1909; Beitr. Z. Geb. u. Gyn., Band 15, 1909.

Pfannenstiel and Thies: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 3, 1909.
Puppel: Zeitschrift f. Geburtshülfe und Gynäkologie, Bands 64 and 65, 1909.
Richard: Zentralblatt f. Gynäkologie, No. 33, 1907.
Richter: Zentralblatt f. Gynäkologie, No. 22, 1909.
Rieländer: Zentralblatt f. Gynäkologie, No. 28, 1909.
Scheffen: Münchener m. Wochenschrift, No. 47, 1909.
Sellheim: Zentralblatt f. Gynäkologie, No. 26, 1907; Gyn. Rundschau, p. 61, 1909.
Sigwart: Zentralblatt f. Gynäkologie, No. 7, 1909; Archiv f. Gynäkologie, Band 89, 1909.
Tissier: Zentralblatt f. Gynäkologie, p. 56, 1907.
Veit: Zentralblatt f. Gynäkologie, No. 32, 1909.
Weber: Zentralblatt f. Gynäkologie, No. 41, 1909.
Wright: American Journal of Obstetrics, November, 1906.

THE CONTROL OF HEMORRHAGE DURING LABOR

Hemorrhage may occur during labor from wounds in the lower uterine segment or cervix. When the tissues are abnormal or altered by some previous pathologic condition, resistance to dilation is present at the internal os, the cervix and lower uterine segment instead of dilating may tear, opening branches of the uterine artery. This is especially seen in primiparous patients with undeveloped cervix and congenital occlusion at the external os.

The writer, on one occasion, was called in consultation by physicians who were conducting a case in the first stage of labor. The uterine contractions were strong, the cervix had become obliterated, but the external os could not readily be found and was congenitally occluded. On examination, a tear extended along the cervix near the vaginal junction, separating the muscular fibers obliquely in an irregular manner. The external os was found drawn upward and backward, admitting the curved director. This was gradually dilated until the finger could be inserted, the cervix then incised, making four flaps, when the head descended and labor terminated. The bleeding stopped as soon as the cervix was opened.

Hemorrhage may also occur during labor from deep tears of the

cervix following the passage of the presenting part. Such hemorrhage is not usually considerable until after the birth of the child,

Fig. 225.—Accidental hemorrhage in which the bleeding is partly concealed and partly apparent. Mixed variety (Kerr).

although it begins during actual labor and will continue until the uterus is empty.

As the head descends upon the pelvic floor, if the patient be undeveloped and expulsive efforts be vigorous and sudden, the pelvic

Fig. 226.—Complete or central placenta prævia. Photographed from Van Rymsdyk's drawing in the Hunterian Museum, Glasgow University (Kerr).

floor and perineum will tear before the head. Such lacerations rarely occasion serious hemorrhage at the moment of birth, but may

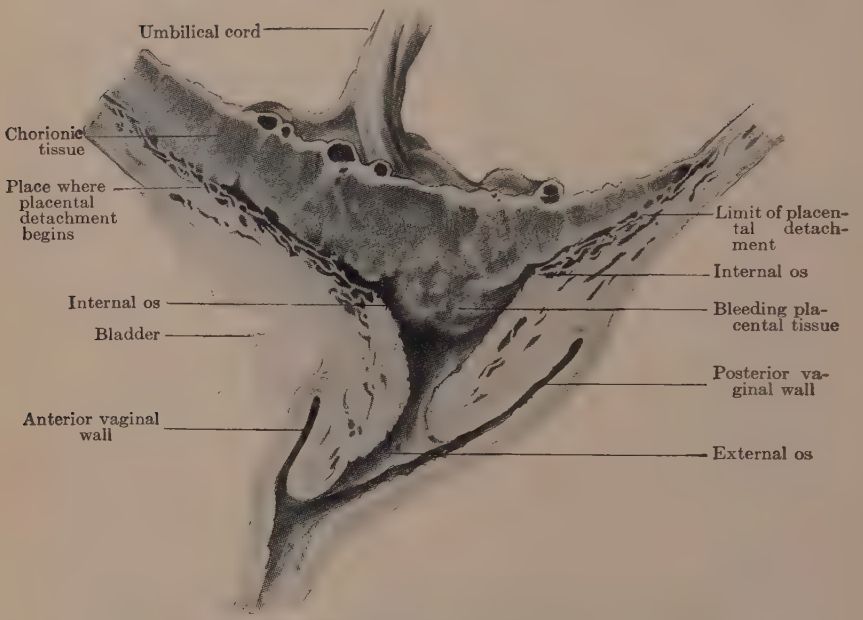

Fig. 227.—The source of bleeding in placenta prævia (Bumm).

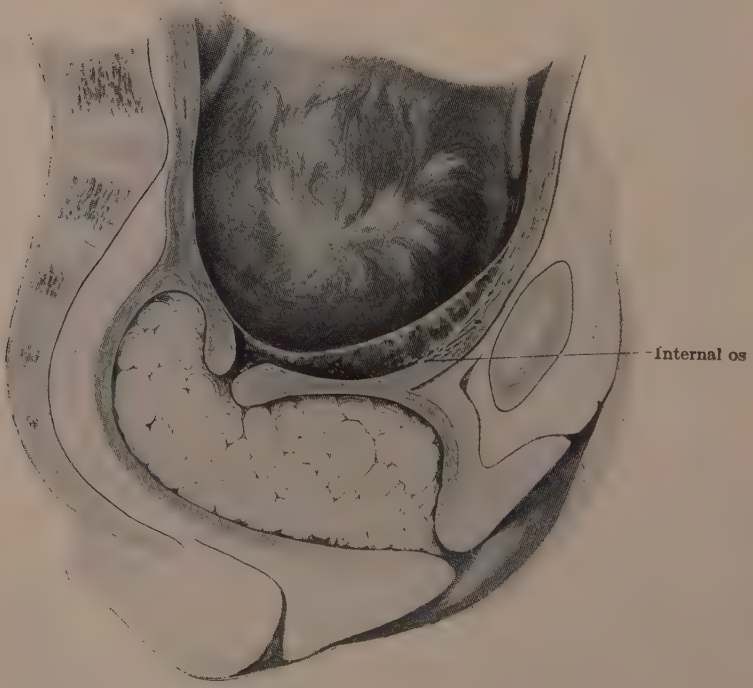

Fig. 228.—Vaginal tampon in placenta prævia (Bumm).

cause persistent bleeding afterward, requiring suture. It is rarely necessary to tie the vessels or take the stitches during labor. Should it be evident that the passage of the head will cause serious and deeper lacerations in the pelvic floor and perineum, unilateral or bilateral episiotomy should be promptly done and the child speedily delivered. In undeveloped primiparæ the anterior segment of the pelvic floor may

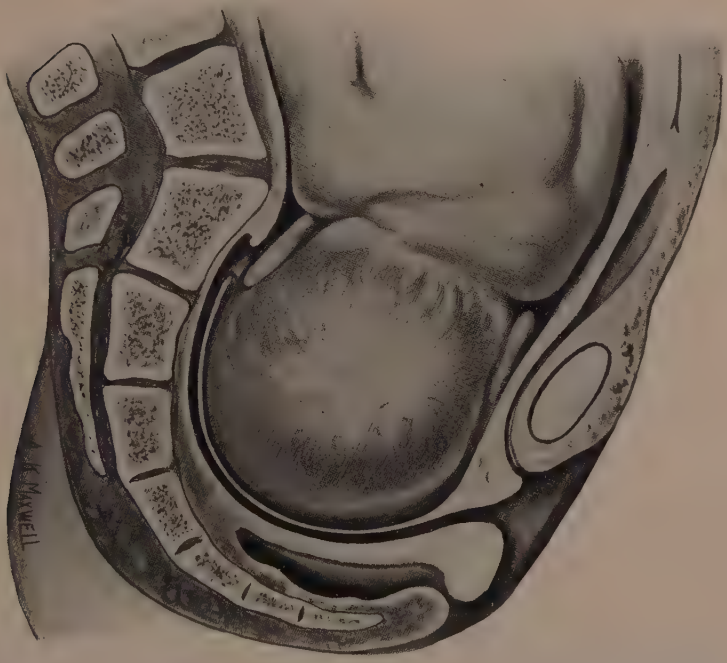

Fig. 229.—Excessive distention of the anterior lip of the cervix, the external os but little dilated, and torn high up posteriorly (Kerr).

tear in the vicinity of the urethra as the head descends. The location of the tear should be noted and it should be closed by suture as soon as labor has terminated. Severe hemorrhage may occur during labor from the bursting of varicose veins in the vulva. A catgut ligature should be deeply passed with a curved needle, compressing and occluding these veins; or, if haste be imperative, hemostatic forceps may be applied.

THE CONTROL OF HEMORRHAGE AFTER LABOR (POSTPARTUM HEMORRHAGE)

Following the delivery of the child active hemorrhage may occur from the uterine sinuses through relaxation of the uterine muscle. This occurs naturally in those cases where the uterine muscle has become exhausted from long and ineffectual labor. If this be the only cause present, hemorrhage will promptly cease when the uterus is empty and its muscle is stimulated to contract. Manual compression of the uterus, accompanied by massage, an intra-uterine douche of hot 1 per cent. lysol or salt solution, and the hypodermic injection of $\frac{1}{15}$ gr. of sulphate of strychnin and 60 minims of aseptic ergot, will in most cases promptly check this hemorrhage. If this result does not follow, the intra-uterine tampon with 10 per cent. iodoform gauze will be found efficient.

In cases where it is necessary to remove the placenta manually to terminate a complicated labor, the operator must choose between the immediate use of the tampon or delay, to permit the other methods already described to accomplish their purpose without the tampon. If the operator has good facilities for asepsis and antisepsis, we believe, in the long run, it is wiser to anticipate hemorrhage after the manual removal of the placenta, and to immediately follow its extraction by the hot antiseptic intra-uterine douche, succeeded by the uterine tampon with 10 per cent. iodoform gauze.

Two methods of packing the uterus with gauze are available: If the operator has few assistants he will do well to insert the left hand within the vagina while an assistant presses the uterus downward into the cavity of the pelvis. The gauze may then be passed with long curved uterine dressing forceps nto the cervix along the palm of the hand within the vagina, and carried by the forceps into the body of the womb. When considerable gauze has accumulated there it should be tightly packed by the longest fingers of the hand within the vagina, pushing the gauze firmly into the cavity of the uterus and completely filling the upper expulsive uterine segment. If the operator trusts to his forceps alone he may carry but a portion of the

gauze into the upper part of the womb, distending the lower uterine segment with the remainder. This will result in a faulty application of the tampon and will further the formation of a large clot above the lower uterine segment, which will favor the continuance of bleeding. If the uterus be properly packed the bleeding is immediately controlled.

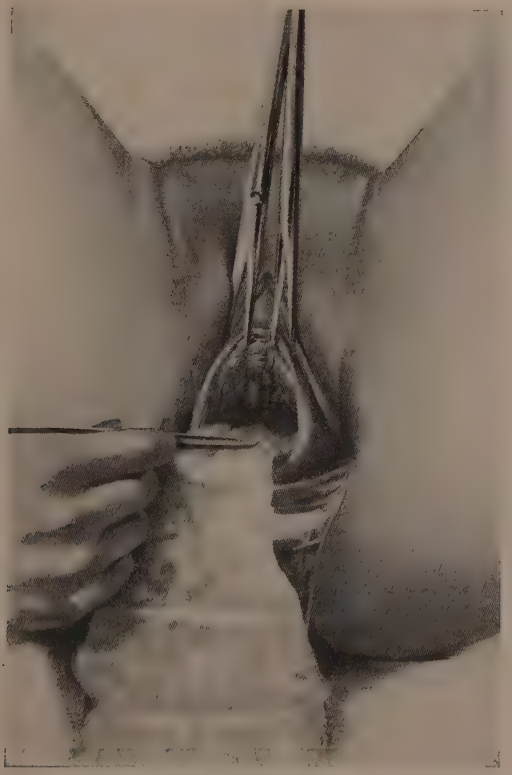

Fig. 230.—Tamponing the uterus with gauze (Bumm).

If the operator has abundant assistance he may grasp the edge of the lips of the cervix with uterine tenaculum forceps and draw them gently downward toward the vulva. Sterile gauze may then be packed around the cervix as a dentist places sheet rubber around the cavity of the tooth which he has prepared for filling. In this way the gauze is protected from the vulva and vagina in its passage into the uterus. The iodoform gauze can then be inserted by the forceps

through the cervix to the fundus and the uterus packed under direct vision. This method, however, is not available unless there be sufficient assistants to hold the limbs in position, and also to hold one of the tenaculum forceps while the operator grasps the other.

The objections to the use of antiseptic gauze within the womb are the danger of infection through contamination of the gauze by the vulva and vaginal tissues, and the danger of wounding the uterus or perforating it during the insertion of the gauze.

Fig. 231.—Genital tract correctly tamponed (Bumm).

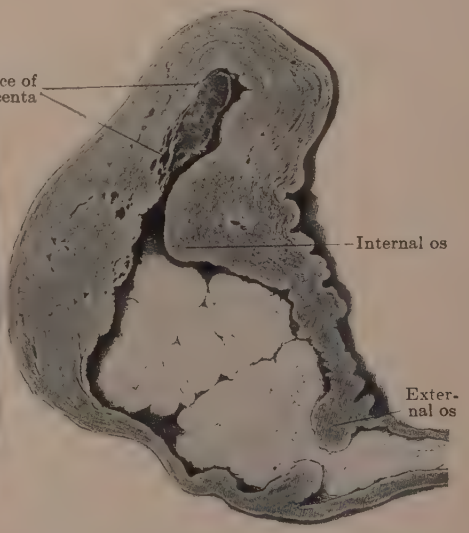

Fig. 232.—Genital tract improperly tamponed. Piece of placenta left in uterus (Bumm).

The writer and his assistants have for some time practised the use of the intra-uterine tampon, and in no case so far have we met with these complications. In one case in the experience of the writer a clot accumulated at the fundus above the gauze and was discharged when the gauze was removed. It gave rise to no symptoms and its presence was not suspected. In our experience the intra-uterine use of the tampon has two advantages: It checks hemorrhage, preventing the accumulation of clots which might become infected,

and might also cause painful uterine contractions or after-pains. The gauze acts as an antiseptic drain to the uterus and prevents the development of infection. In our experience the advantages of this method far outweigh its possible objections.

In cases complicated by toxemia it may be very difficult to check bleeding from the uterus occurring after labor. The coagulability of the blood in these cases is so lessened by the toxemic condition that

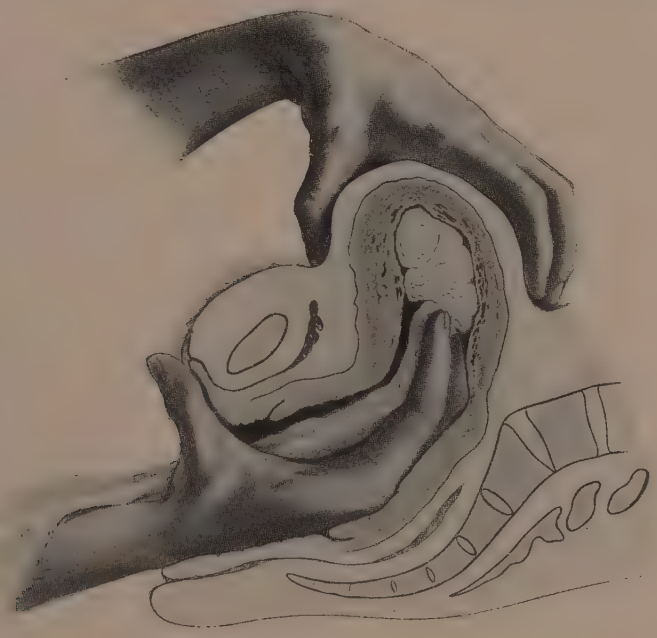

Fig. 233.—Manual tamponing of the uterus (Bumm).

the blood does not clot, and pressure is not efficient in completely checking hemorrhage. In these cases the use of adrenalin (1 : 1000) may prove advantageous, and it may be necessary to renew the uterine tampon to control bleeding. In extremely toxemic patients it may be impossible to control hemorrhage, and the patient may die as a consequence.

The effort has been made to control uterine hemorrhage after labor by applying clamps to lacerations in the cervix and leaving them in position for a number of hours. While this method may

be successful in some cases, it is more dangerous and less efficient than the tampon properly applied.

In cases where hemorrhage is severe and death threatens, it may be necessary to completely arrest hemorrhage from the pelvic vessels by manual compression of the abdominal aorta or its branches at its bifurcation.

The experience of the writer may serve to illustrate this method: An anemic multipara was admitted to the Jefferson Maternity, having bled severely from accidental separation of the placenta. The cervix was partly dilated, an eight-months' fetus was within the womb, and the patient was pulseless. She was hastily placed in position, and while her arm was prepared for intravenous saline transfusion the writer emptied the uterus promptly by manual dilation and extraction of the uterine contents. The hand was introduced within the womb and tightly closed and the fist carried up within the uterine fundus to the brim of the pelvis. The knuckles were then pressed firmly against the branches of the abdominal aorta near its bifurcation, and the circulation of the pelvis practically arrested. This pressure was continued until intravenous saline transfusion could be given, and hypodermic stimulation. Without removing the hand a glass douche tube was then introduced within the uterus, and its cavity irrigated with hot salt solution. While the uterus was compressed through the abdominal wall the hand was removed and the uterus securely packed with 10 per cent. iodoform gauze. The hemorrhage was thus controlled and the patient recovered.

In our experience this has been a more efficient method than the device advised by Momburg, described in a recent paper by Sigwart.[1] Sigwart's method consists in passing a strong elastic band around the abdomen above the pelvic brim and practically applying a tourniquet to the abdominal aorta. He describes 19 cases in which this device was used to check hemorrhage until some other method could be employed for its permanent arrest.

In cases of severe hemorrhage from the body of the uterus after

[1] Archiv f. Gynäkologie, Band 89, Heft 1, 1909.

labor, although the operator may succeed in checking the bleeding, he must be prepared for secondary shock and hemorrhage within a few hours. Usually it is possible to control this by hypodermic stimulation without disturbing the intra-uterine tampon.

In the experience of the writer, an anemic multipara bled severely three times within four days following her delivery. It was necessary on each occasion to renew the uterine tampon, in addition to the employment of other means. The patient finally recovered without infection, her recovery being complicated by a persistent anemia.

In cases of serious uterine hemorrhage, after the means described have been employed, good results may be obtained by the application of the interrupted Faradic current, one pole being placed over the lower dorsal and upper lumbar region, the other pole over the uterus. The current may be applied from half an hour to an hour with positive benefit. Too much reliance cannot be placed upon adrenalin in these cases, as its effect is short lived, and its continued use may further the occurrence of hemorrhage rather than control it.

It is the writer's belief that the introduction of ice, of vinegar, and of corrosive styptics within the uterus should be abandoned for the tampon of antiseptic or sterile gauze. In extreme cases, as has been said, the gloved hand is promptly efficient and enables the operator to apply the tampon when the initial bleeding has been controlled.

Bleeding After Labor from Rupture of the Uterus.—If uterine rupture be diagnosticated as the cause of hemorrhage, the operator must decide promptly whether he will open the abdomen and control the hemorrhage by suture or by hysterectomy, or whether he will endeavor to rescue the patient without abdominal section. If the rupture be complete and if the content of the uterus has escaped in considerable part into the abdominal cavity, abdominal section is indicated. When the fetus and its appendages have been removed, the operator must choose between hysterectomy and suture. If the uterus is in a healthy condition and the uterine muscle contracts when the womb is empty, and if the tear is not extensive, the operator may try to save the womb by the application of sutures. Usually two layers of catgut

will be required, and after suture the abdomen must be closed with the insertion of a gauze drain passed to the bottom of the pelvis behind the womb.

If, on the contrary, the womb be flabby, or if the uterus be the site of fibroid disease or infection, hysterectomy must be chosen. If the patient's condition justifies it, and infection be absent, celiohysterectomy with intraperitoneal treatment of the stump can be selected. If there is good reason to fear infection, and haste is imperative, celiohysterectomy with extraperitoneal treatment of the stump (Porro operation) must be chosen.

Secondary Puerperal Hemorrhage from the Uterus (Postpartum Hemorrhage).—Under the term "postpartum hemorrhage" is commonly understood secondary relaxation of the womb, occurring at any time after the patient has apparently completed her labor and been left in good condition. This most often occurs in exhausted patients whose nervous and muscular energies are deficient and whose labor has been prolonged and often excessively painful. It is frequently accompanied by the accumulation of clots within the womb whose presence prevents the free escape of blood through the vagina, thus obscuring the diagnosis and complicating the treatment. In women of relaxed fiber retained postpartum hemorrhage may reach large proportions.

In the experience of the writer, a multipara, after the birth of her child, was taken with labor-pains without vaginal hemorrhage, and asserted that a twin child was within the womb. On examination a clot as large as a fetal head was found in the uterus requiring removal and vigorous treatment to prevent further hemorrhage.

As this complication frequently develops after the physician has left his patient, supposing her to be in good condition, its recognition and initial treatment become the duty of the nurse. Obstetric nurses should be especially taught to recognize this form of hemorrhage and to take active measures without waiting for the arrival of the physician. It is our custom to teach the nurses at the Jefferson Training School to watch the uterus after labor by frequent palpation, to

observe the condition of the uterine muscle, and the size of the womb. The binder is not to be applied until the womb has contracted firmly, and so remains for at least one hour after labor. If the uterus contracts slowly the application of the binder is to be accompanied by the placing of a large pad transversely across the abdomen above the uterus, carrying the uterus firmly down toward the pubes. The binder is then applied from above downward, or a many-tailed abdominal bandage may be used, such as is employed after section; but the nurse should not apply the binder or abdominal bandage until the uterus is properly contracted. The nurse should further watch the patient by noting her pulse, her color, her general appearance, and the presence or absence of thirst, air hunger, and restlessness. Should these symptoms develop after labor, the binder should be immediately removed and the nurse should massage the uterus until it is firm and hard. The obstetrician should at once be summoned and the nurse should immediately proceed to the administration of strychnin and ergot hypodermically, and the giving of a copious vaginal douche of hot boiled water.

We do not believe that nurses incompetent to carry out this treatment should be trusted with obstetric cases. If these measures have been carried out promptly, when the physician arrives he will find the initial hemorrhage controlled in the majority of cases. It will then be his responsibility to decide whether the tampon shall be introduced, if it has not been employed, and what measures shall be taken to secure permanent uterine contraction. In our experience, competent obstetric nurses control the simple forms of postpartum hemorrhage, and the physician's services are needed in the more complicated varieties and in the ordering of the after-treatment.

While uterine hemorrhage may be temporarily checked after labor, its permanent arrest may require the obstetrician's best efforts. In addition to the use of the tampon, the hot vaginal douche, and the administration of strychnin and ergot, the patient's vital forces must be guarded and freely stimulated to secure permanent recovery. The patient should be placed as nearly as possible in the Trendelen-

burg position. It is useless to raise the foot of the bed but a few inches. The head must be as low as possible, and beneath the base of the brain should be placed a hot-water bottle covered with only one or two layers of flannel. The limbs may be bandaged from the extremities to the trunk, and the trunk of the body surrounded by artificial heat. It is well to avoid the use of stimulants by the mouth, for their absorption is so slow and uncertain and they may also cause nausea. Alcohol is not indicated in active hemorrhage. Intravenous saline transfusion is of great value, but care should be taken not to introduce too large a quantity. More than a pint is very rarely necessary. If the obstetrician is not prepared to carry out this treatment, the high rectal injection of 4 ounces of freshly made hot strong coffee, with 8 ounces of salt solution, will be found useful. The use of the interrupted electric current, one pole over the cerebellum, the other over the heart, will be found of great value in desperate cases. The inhalation of oxygen may be useful, but it is often impossible to obtain it promptly, and its use may frighten and disturb the patient. If she be anxious and excited, the hypodermic injection of morphin and atropin will be found most useful. Her excessive thirst may be met by rectal injections of salt solution, and after the hemorrhage has been checked 1 ounce of whiskey and 8 ounces of salt solution may be administered every two to four hours. When fluid is given by the mouth, small quantities of water containing 20 drops of aromatic spirits of ammonia will be beneficial. After the uterus has firmly contracted, if gauze packing has been inserted, it is well to avoid the excessive use of ergot, as uterine contractions may be excited which will expel the gauze. If $\frac{1}{30}$ gr. of strychnin be given hypodermically every three or four hours the uterus will be maintained in tonic contraction and the gauze will not be forced out. To sustain the action of the heart, digitalin may be given in doses sufficiently large to produce the desired effect. The obstetrician must remember that hemorrhage opens wide the doors for infection, and that his manipulations must be conducted under strict antiseptic precautions.

Late Puerperal Hemorrhage.—Puerperal hemorrhage from the

uterus occurring some time after labor, when the patient is apparently convalescent, or recurring in small quantity but frequently, must suggest the presence within the womb of a retained portion of placenta. Such hemorrhage will not cease until this has been removed. The obstetrician must explore the interior of the womb with the gloved hand or with a blunt douche curet, removing the retained tissue. This should be followed by the hot antiseptic douche and packing with 10 per cent. iodoform gauze.

In some cases the experiment has been tried of saturating the gauze used for intra-uterine packing with adrenalin (1 : 1000). While this may seem temporarily beneficial, it has no essential advantage over antiseptic gauze and is of doubtful utility. The convalescence of a patient who has had severe uterine hemorrhage in the puerperal period is necessarily prolonged and calls for the treatment appropriate for pernicious anemia.

One of the older methods of checking hemorrhage, thought to be of great value, was the placing of the child to the breast. If the child will nurse vigorously and promptly this will undoubtedly cause uterine contractions, but in many cases it will not do so. The effort to cause it to grasp the nipple worries and excites the mother, and in our experience this method is too unreliable and slow to compete with more prompt and efficient surgical measures.

If the obstetrician fails to control hemorrhage from the uterus after labor by the methods described, he must recognize a condition of advanced toxemia, or possibly the development of syncytioma malignum. The writer has seen both of these conditions cause death within a few days after labor. Up to the present time we are not aware of any method of treatment which will save life under these conditions. Hysterectomy is scarcely possible with successful result in patients so depleted.

Puerperal Hemorrhage from the Torn Cervix.—If persistent bright bleeding occurs after the uterus is empty, while the contractile portion of the uterus is firmly closed, the operator must suspect hemorrhage from branches of the uterine artery. On inspection a con-

siderable tear of the cervix will be found, from which bright blood is slowly trickling If the operator is without suitable facilities for applying suture he must trust to the intra-uterine and vaginal tampon to check this bleeding In many cases this will be successful. This

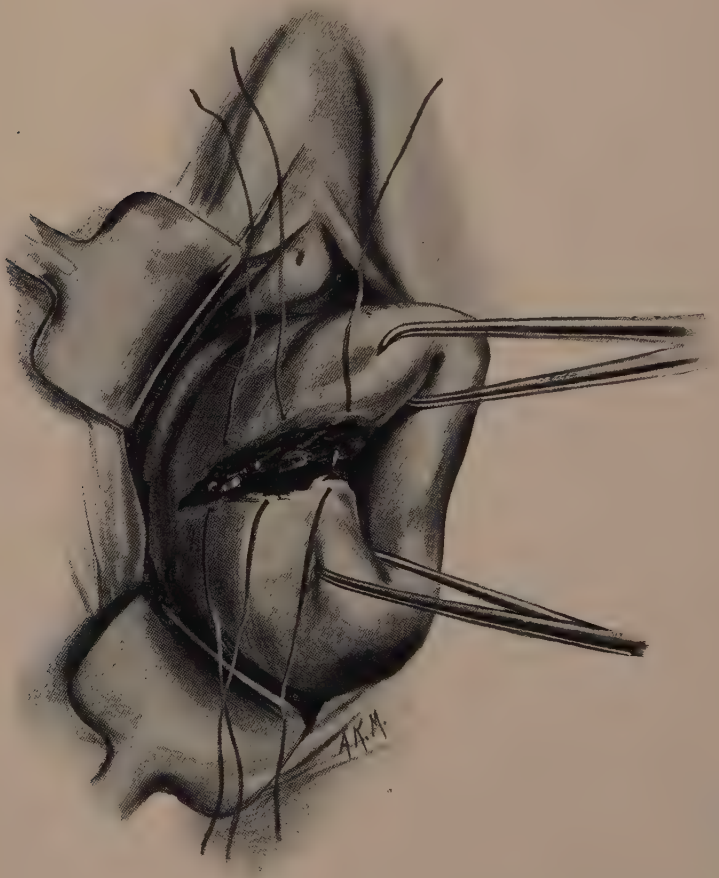

Fig. 234.—Stitches applied in suturing a lacerated cervix (Kerr).

method is, however, far inferior to the immediate control of the hemorrhage by suture. For this purpose, if possible, the two lips of the cervix should be grasped by the tenaculum forceps and drawn down to the vulva. The cervix should be carried strongly to the side opposite that which has been lacerated, the vulva opened by the

fingers of an assistant or by a retractor, which will easily expose the site of bleeding. No. 2 chromicized catgut should then be passed beneath the bleeding surfaces at the highest point of the laceration. The first stitch is often hard to apply, for the laceration may extend to the vaginal junction. The operator should persist, however, until he has satisfactorily inserted this stitch. It should immediately be tied and cut short. If this does not control the hemorrhage, other stitches should be inserted until the bleeding surfaces are brought firmly in apposition.

Hemorrhage After Labor from Lacerations in the Posterior Segment of the Pelvic Floor.—Lacerations in this portion of the birth-canal frequently extend so deeply that vessels are opened which bleed freely. As in the case of the cervix, such bleeding can be to some extent controlled by the tampon, but every effort should be made under aseptic precautions to immediately stop this bleeding by suture. To efficiently place such stitches the pelvic floor must be raised for inspection. This is accomplished by passing the long finger of the gloved left hand into the rectum and raising the pelvic floor for the inspection of the operator. With a curved needle No. 2 chromicized catgut should be inserted deeply, the needle passing through the whole extent of the lacerated surfaces, and the pelvic floor brought accurately together. Sutures should begin from the highest point of the laceration and be carried outward toward the perineum. If the tears be deep the stitches should be completely buried, and in severe cases it may be necessary to insert two layers of sutures.

When the perineum is extensively torn the vessels in the skin surface may bleed as well as those in the weakest membrane of the vagina. Small cutaneous vessels may be controlled by the application of hemostats, which may be left until the operator can repair the pelvic floor first, and then turn his attention to the perineum. In complete laceration, small vessels in the rectal vaginal septum may require the application of hemostatic forceps and may be efficiently closed by a separate ligature of fine catgut Whenever possible, the control of hemorrhage in lacerations should be immediately

followed by the complete closure of the tear. In extensive and unusual tears of the pelvic floor and perineum the mucous membrane may be separated from the subjacent tissue and blood may accumulate beneath the vaginal surface. In these cases the vaginal mucous membrane should be incised, the clotted blood turned out, the surface thoroughly irrigated with salt solution, and deep stitches placed to control bleeding.

Fig. 235.—Thrombosis and hematoma of the vagina (Bumm).

Hematoma of the labium may develop during and immediately after labor as the result of injury to the vessels beneath the mucous and cutaneous surface. If the tumor be small, and no other serious laceration be present, and if no opening exists between the tumor and the vagina or surface of the skin, the tumor need not be incised, but its further growth prevented by gauze pressure. If, however, the tumor increases rapidly in size and leaks into the vagina or upon

the skin, a free incision should be made, the clot turned out, and buried sutures taken, or the cavity of the clot thoroughly packed with 10 per cent. iodoform gauze. Very rarely in severe injuries to the genital canal hemorrhage occurs into the subperitoneal and submucous tissue above the vagina and around the cervix. Such hemorrhage is usually controlled by the intra-uterine tampon, accompanied by the firm tamponing of the vagina with antiseptic gauze.

Hemorrhoidal veins enlarge during pregnancy, may be wounded during delivery, and may bleed freely. Such hemorrhage can be controlled by tying the vein at the point of bleeding or by passing a catgut ligature deeply beneath the vein and tying it.

Hemorrhage in the Anterior Segment of the Pelvic Floor Occurring After Labor.—If the anterior segment of the pelvic floor be examined in all cases of labor, in a considerable percentage, perhaps one-third, there will be found lacerations on one or both sides near the orifice of the urethra, occasionally as high as the clitoris, sufficiently deep to cause bleeding.

In a case in the writer's experience in a primipara, such a laceration was the only one which occurred during labor, and caused sufficient hemorrhage to require immediate suture. This condition can be diagnosticated by inspecting the parts and thoroughly sponging them with cotton or gauze sponges dipped in salt solution or 1 per cent. lysol. To stop such hemorrhage No. 1 or 2 chromicized catgut should be passed with a fine needle completely around the bleeding surface. If the laceration be extensive it is well to introduce a catheter into the bladder to avoid carrying the needle into the urethra. The puncture made by the needle will often bleed slightly in these cases, but considerable hemorrhage is at once controlled, and the needle wound soon ceases to bleed.

It is of the greatest importance in the avoidance of infection, and the securing of prompt recovery from labor, that hemorrhage after labor be promptly controlled. There is certainly no adequate reason why the puerperal woman should not have the benefit of the same methods of hemostasis commonly employed in other branches of

surgery. It may be urged that confinements are conducted under circumstances which make the surgical treatment of the parturient woman impossible. To this we reply that modern obstetric science is conducted upon surgical principles, and that one is not competent to practice modern obstetrics who does not have the facilities for surgical treatment and who is not competent to employ them.

Bibliography of Hemorrhage Complicating Labor and the Puerperal State

Ahlfeld: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 54, Heft 1, 1905.
Busse: Zentralblatt f. Gynäkologie, No. 7, 1909.
Davis: Progressive Medicine, p. 195, 1908.
Edgar: American Journal of Obstetrics, December, 1908.
Göth: Zentralblatt f. Gynäkologie, No. 15, 1908.
Henry: British Medical Journal, June 8, 1907.
Hense: Zentralblatt f. Gynäkologie, No. 29, 1908.
Herzfeld: Archiv f. Gynäkologie, Band 82, 1907.
Höhne: Zentralblatt f. Gynäkologie, No. 10, 1909.
Ihm: Inaug.-Diss., Heidelburg, 1906.
LePage: British Medical Journal, January 26, 1907.
Martin: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 23, Heft 2, 1906.
Mathar: Inaug.-Diss., Freiburg, 1906.
Momburg: Zentralblatt f. Chirurgie, No. 23, 1908.
Rieländer: Zentralblatt f. Gynäkologie, No. 28, 1909.
Sigwart: Zentralblatt f. Gynäkologie, No. 7, 1909; Berliner k. Wochenschrift, No. 43, 1909; Archiv f. Gynäkologie, Band 89, 1909.
Stowe: Surgery, Gynecology, and Obstetrics, June, 1907.
Zickel: Zentralblatt f. Gynäkologie, No. 34, 1908, and No. 15, 1909.
Weber: Zentralblatt f. Gynäkologie, No. 41, 1909.
Westermark: Archiv f. Gynäkologie, Band 89, 1909.

PLACENTA PRÆVIA

Hemorrhage before, during, and after labor may arise from the abnormal situation of the placenta or premature separation of the normally implanted after-birth.

For purposes of operation, placenta prævia may be divided into central or complete and partial or incomplete. In the former, the spontaneous recovery of the patient cannot be expected, as hemor-

rhage cannot cease until the uterus is emptied, and labor cannot go on without separating the placenta and producing hemorrhage.

The older methods of treatment consisted in tamponing or plugging the cervix, in the hope of making sufficient compression upon the placenta to check bleeding until delivery could be accomplished. The application of cotton tampons tightly packed and, later, the use of antiseptic gauze as a tampon have been extensively practised and recommended. The introduction of Bossi's dilator led to the use of this instrument for the rapid dilation of the cervix. The Braxton-Hicks method, which consists in grasping a foot of the fetus and bringing down the leg and breech as a tampon, has long been used.

Each of these methods left much to be desired. In the Braxton-Hicks procedure the effort to grasp the foot of the fetus led to increased separation of the placenta, to renewed bleeding, and sacrificed the life of the child. Experience has shown that the use of the tampon, even under antiseptic precautions, has been followed by considerable hemorrhage and infection, and that the child has often been lost. These methods of treatment, however, are still extensively practised in private houses by general practitioners, and are often the best method available for a given case.

Of late years the frequent practice of delivery by abdominal section has proved successful in some cases of central placenta prævia. The application of intraovular pressure, by piercing the placenta and introducing an elastic bag through its substance into the sac of the ovum, has also given good results.

Pfannenstiel (Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 3, 1909) advises that the bag be grasped with suitable forceps and introduced through a speculum, the cervix being firmly held at the same time. The forceps for applying the bag should be long enough to reach to the interior of the ovular sac, and should have a pelvic curve. The placenta must be pierced by the bag in the grasp of the forceps, and the thinnest portion of the placenta available should be sought for this purpose; 500 c.cm. of sterile salt solution should then be injected and the bag fully distended within the ovular

sac and above the placenta. It is estimated that a pressure of 1 kilo can thus be exerted. Every effort should be made to secure the spontaneous expulsion of the bag, when the operator can proceed to terminate labor, usually by version and extraction.

The results of the so-called conservative methods of treating placenta prævia in recent years may be estimated from Novak's extensive review of the subject (Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, Heft 2, 1909). From the simple procedure of rupturing the membranes in partial placenta prævia, and allowing uterine contractions to compress the placenta, he finds 163 cases reported by different authors, with no maternal mortality. The mortality among the children at birth was 25, or 15.3 per cent. This represents the simplest forms of placenta prævia and the simplest available treatment which is sufficient for the mother, but attended by considerable fetal mortality. In addition to the children stillborn a considerable number of those living at birth die soon afterward from weakness.

When version and extraction were practised he found in 878 cases reported by different authors a maternal mortality of 8.8 per cent. and a fetal mortality of 71.8 per cent.

Weischer, in Olshausen's clinic in Berlin (Zeitschrift f. Geburtshülfe und Gynäkologie, Band 67, Heft 2, 1910), in combined version had a maternal mortality of 7.4 per cent. and a fetal mortality of 74.1 per cent. Other authors report slightly different mortality rates for this method of treatment, but the general result is much the same.

By the use of dilating bags Weischer's maternal mortality was 8.5 per cent. and the fetal mortality 46.8 per cent.

Hammerschlag, Hannes, and Bürger-Graf had a maternal mortality of 5.8 per cent.; Zimmermann, 6 per cent.; Holst, 12.5 per cent., and Sigwart, in 33 cases treated by the use of bags, had no maternal mortality.

In fetal mortality, Thies had 14 per cent.; Dührssen, 16.6 per cent.; Freund, 20 per cent.; Hannes, 30 per cent.; Keetman, 50 per cent.; Zimmermann, 62 per cent.; Holst, from 60 to 65 per cent.

Weischer ascribes the maternal mortality in his cases to the fact that patients were admitted to the hospital much prostrated by loss of blood, and that the treatment which ended labor produced additional hemorrhage sufficient to turn the scale. He concludes that the use of bags should be practised only when the child is living, at full term, and in fairly good condition.

Novak has collected 2081 cases in the literature reported by different authors, in which various methods of treatment, exclusive of Cesarean section, were practised. The maternal mortality of this series is 8.65 per cent.; the fetal mortality, 56.72 per cent.

In view of the high maternal mortality from the use of bags, it is evident that their use is justifiable only in cases where the bag can be introduced with the least possible disturbance to the placenta, and without increasing materially the hemorrhage which threatens the mother's life. Their use is indicated in partial placenta prævia where the rupture of the membranes is not followed by prompt uterine action and by sufficient dilation to bring the presenting part firmly against the placenta. In central placenta prævia their use can be successful only in those exceptional cases where the placenta is so thin at some available point that it can be readily pierced by the bag in the grasp of the forceps without producing much separation or free hemorrhage.

The high mortality of placenta prævia treated by other methods has led to the resort to Cesarean section. Early experience seemed to indicate that no essential gain would be made by section.

Mattoli's remarkable case (Arch. ital. di ost. e. gin., 1899), a successful delivery by Cesarean section of an anemic woman with central placenta prævia, is reported. The operation was performed in a dirty kitchen and was followed by undisturbed recovery, indicating the possibilities of the operation.

Bumm (Zentralblatt f. Gynäkologie, No. 52, 1902) reported a case of central placenta prævia successfully treated by vaginal section. Büttner, Döderlein, and Nijhoff reported successful cases treated by vaginal section. Krönig and Sellheim, in 1907, drew attention to

the value of cervical section, while Zweifel declared against it. In cases of rigid cervix Henkel would perform cervical section in the interests of the mother. Sellheim, by extraperitoneal section in 8 cases, had the recovery of 8 mothers and 8 children. Baisch, from Döderlein's clinic, in 40 cases of vaginal Cesarean section had the recovery of all the mothers, and in 22 children living before the operation 19 were born living. Among this series of vaginal sections were 10 done for placenta prævia.

Thies (Monatsschrift f. Geburtshülfe und Gynäkologie, p. 270, 1909) reports from the Charité clinic in Berlin 178 cases of placenta prævia treated by different methods, with 3 per cent. maternal mortality. Among these cases 11 were treated by the use of bags, with the birth of 11 living children. Many of these cases were polyclinic cases, in which the use of the bag was successful in the houses of patients.

Gussakow, in Fenomenow's clinic in St. Petersburg, believes that all methods are dangerous which produce uterine contractions before the rupture of the membranes. The use of the tampon is not indicated for this reason, and because it predisposes to infection. In partial placenta prævia the rupture of the membranes often checks the hemorrhage. In addition to this the use of the dilating bag is indicated.

In central placenta prævia, if the life of the child is held valuable, Cesarean section is indicated.

Hauch, from the clinic in Copenhagen (Monatsschrift f. Geburtshülfe und Gynäkologie, Band 31, Heft 5, 1910), believes that the use of the bag should lessen fetal mortality without greatly increasing the maternal mortality.

Kupferberg (Monatsschrift f. Geburtshülfe und Gynäkologie, Band 31, Heft 5, 1910), in using the bag for dilating purposes in placenta prævia, produced an extensive tear in the cervix, extending above the vaginal junction, followed by alarming hemorrhage.

Pankow, in Krönig's clinic in Freiberg (Zeitschrift f. Geburtshülfe und Gynäkologie, Band 64, Heft 2, 1909), reports 8 successful cases of suprasymphyseal section for placenta prævia.

Döderlein (Archiv. f. Geburtshülfe und Gynäkologie, Band 92,

Heft 1, 1910) writes a critical paper drawing attention to the advantages of the suprasymphyseal section.

Sippel (Monatsschrift f. Geburtshülfe und Gynäkologie, Band 33, Heft 3, 1911) reports a case of placenta prævia in which profuse hemorrhage was checked by bringing down the fetus through traction upon the leg. As this did not control the bleeding, abdominal Cesarean section was performed, followed by supravaginal amputation of the uterus, with the patient's recovery.

Novak (Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, Heft 4, 1909) contributes a critical paper in which he reviews the statistics of various European clinics and the results by the various methods of treatment of placenta prævia. He admits it is possible in cases where there is some stricture of the uterus to improve the maternal results by Cesarean section. The results for the fetus by other methods of treatment are so disastrous that where value is placed upon fetal life, Cesarean section is indicated. He makes the significant observation that the objections to Cesarean section lie in the fact that the patient usually comes under the observation of the operator when profoundly anemic and infected by the careless use of the tampon. He believes that the classic Cesarean section will prove the best method of delivery.

An analysis of these statistics and the writer's experience lead him to believe that cases of placenta prævia should be divided into two classes: the first are those in which the placenta does not completely cover the os; or in which the greater portion of the placenta is upon the lateral wall of the uterus, and but one lobe covers the os, leaving a thin portion between the greater and the lesser placental mass. In these two classes of cases rupture of the membranes, or rupture of the thinned portion of the placenta, and stimulation of uterine contractions will usually suffice to check hemorrhage and make delivery reasonably safe for the mother. The fetal mortality under such conditions must be high, for labor is delayed and there is danger of infection in the fetal sac. Whether pressure be applied without the sac of the ovum or within the sac of the ovum, it

must be done in such a manner as to disturb the placenta as little as possible, and not to increase the hemorrhage. If the bag can be introduced under these conditions, it will shorten labor and should lessen fetal mortality somewhat. These methods should be preferred to the Braxton-Hicks method or the use of the tampon, because the latter disturbs the placenta more, excites more hemorrhage, and causes greater fetal mortality. These methods, however, are available in private houses, and may often be successfully used by inexperienced operators.

In cases where the greater placental mass is directly over the internal os, it is of the utmost importance that as little disturbance as possible by examination or treatment should be practised. The first hemorrhage is usually so characteristic that a diagnosis may often be made by this, and confirmed by a very cautious vaginal examination. With mother and child in good condition, abdominal classic Cesarean section should be practised as speedily as possible. This should not be followed by a greater maternal mortality than the most favorable results in all cases of placenta prævia, namely, Thies' statistics of 3 per cent. The fetal mortality should be reduced greatly by such a procedure.

We have had the opportunity of putting this reasoning in practice in 3 suitable cases in which we practised abdominal Cesarean section. The three mothers recovered, and two of the three children, one being premature, survived but a short time.

There is, we believe, some analogy between placenta prævia and ectopic gestation. In each the cardinal dangers are from hemorrhage and infection, occasioned by the abnormal attachment of the ovum. In each the only reliable method of treatment consists in operation. In placenta prævia, in cases at full term, with mother and child in good condition, the life of the fetus cannot be entirely disregarded.

Bibliography of Placenta Prævia

Baisch: Münchener med. Wochenschrift, No. 3, 1909.
Calzolari: Annali di Ostetricia e ginecologia, No. 8, 1909.
Döderlein: Archiv f. Gynäkologie, Band 92, Heft 1, 1910.

Fry: American Journal of Obstetrics, January, 1909.
Füth: Zentralblatt f. Gynäkologie, No. 5, 1911.
Gussakow: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 32, Heft 3, 1910.
Hannes: Zentralblatt f. Gynäkologie, No. 3, 1909.
Hauch: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 31, Heft 5, 1910.
Jewett: American Journal of Obstetrics, June, 1909.
Krönig: Zentralblatt f. Gynäkologie, Nos. 15 and 34, 1909; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 1, 1909.
Moncalvi: Annali di Ostetricia e Ginecologia, No. 11, 1909.
Newell: American Journal of Obstetrics, June, 1909.
Novak: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, Heft 3 und 4, 1909.
Olow: Zentralblatt f. Gynäkologie, No. 13, 1910.
Pankow: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 64, Heft 2, 1909.
Pfannenstiel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 3, 1909.
Richter: Zentralblatt f. Gynäkologie, No. 22, 1909.
Runge: Zentralblatt f. Gynäkologie, No. 31, 1909.
Sigwart: Zentralblatt f. Gynäkologie, No. 28, 1910.
Sippel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 33, Heft 3, 1909.
Thies: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 3, 1909.
Weischer: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 67, Heft 2, 1910.
Zimmermann: Zentralblatt f. Gynäkologie, No. 10, 1909.

PREMATURE DETACHMENT OF NORMALLY IMPLANTED PLACENTA

This accident is considered by many as more common than placenta prævia. It is frequently more difficult to recognize, as there may be no apparent hemorrhage, and attention may not be called to the patient's condition until pain and syncope indicate the gravity of the accident.

Goodell, in 1869, collected 106 cases; Holmes, in 1901, added 200; Colclough, in 1902, reported 82 cases, and Goldstine (Surgery, Gynecology and Obstetrics, February, 1910) adds 98.

This accident probably occurs about once in 250 labors. Slight

separation is frequently not noticed, and may be inferred when, after the expulsion of the child, dark, clotted blood is expelled with the placenta. In most cases the hemorrhage makes its way through the vagina, while in a small proportion clotted blood remains within the uterus, greatly distending the uterus and separating the placenta until fetal death occurs and the patient is brought into a dangerous condition through syncope.

In 488 reported cases, 365 had external or mixed hemorrhage, and in 123 the bleeding was concealed. The symptoms are those of developing anemia, with pain and tension of the uterine muscle, making it impossible to accurately hear the fetal heart. Should hemorrhage continue, and the patient pass into a grave condition, the tone of the uterine muscle will be lost and it will become a flaccid tumor, distended with blood-clot.

The maternal mortality is stated by Goodell as 50.9 per cent.; the fetal mortality as 94.4 per cent. Holmes, maternal mortality, 32.2 per cent.; fetal mortality, 85.8 per cent. DeLee, maternal mortality, 50 per cent.; fetal mortality, 90 per cent. Herzfeld, maternal mortality, 29 per cent.; fetal mortality, 82.79 per cent. Colclough, maternal mortality, 9 per cent.; fetal mortality, 90 per cent.

Reports of the Rotunda Hospital, Tweedy, master, maternal mortality, 10 per cent.; fetal mortality, 95 per cent.

Should the patient escape death during delivery, postpartum hemorrhage is often severe and may turn the scale. Rupture of the uterus is not rare in these cases.

The older method of treatment consists in rupturing the membranes and employing the tampon until the cervix is sufficiently softened to make rapid dilation possible, followed by version, and later by spontaneous birth or extraction. Statistics show that there is a marked difference in the results when delay is practised after the rupture of the membranes, or when the operator proceeds to immediate extraction. Immediate operation is dangerous in these cases, because the patient is more or less weakened by hemorrhage, the uterus is atonic, and will not contract promptly, the patient is in

no condition for general anesthesia, and rapid dilation of the cervix is accompanied by serious laceration. Postpartum hemorrhage after immediate delivery is often severe. The Rotunda method, advocated and practised by Colclough, Smyley, and Tweedy, consists in firmly tamponing the vagina, having previously, if possible, ruptured the membranes. The abdomen is then tightly bandaged from above downward, the bladder emptied by catheter, and the patient given sufficient opium to relieve pain and restlessness. The tampon is left, if possible, until uterine contractions expel it, if within twenty-four hours. Should this not occur, it is removed in twenty-four hours and replaced. Better results are sometimes obtained when the membranes are not ruptured, although the method is successful after the amniotic liquid has escaped.

The most recent method of applying this treatment consists in using tampons of sterilized cotton-wool moistened with salt solution or weak bichlorid solution. With the lithotomy position, using the fingers of one hand as a speculum, the cotton pledgets, squeezed almost dry, are introduced in such a manner as to form a ring around the cervix and to pack the entire vagina as tightly as possible. A large piece of gauze is placed externally, and the abdominal and perineal bandages are applied. The tampon is removed should the pains become vigorous, should the tampon bulge when hemorrhage appears externally, or when the patient has an attack of syncope. The bladder should be frequently emptied by catheter. Out of 69 cases reported by Goldstine, hemorrhage was thus controlled in 66.

In view of the high maternal and fetal mortality following this accident, other methods of treatment than the tampon have been employed.

Sigwart (Zentralblatt f. Gynäkologie, No. 7, 1909; Archiv f. Gynäkologie, Band 89, 1909), Höhne (Zentralblatt f. Gynäkologie, No. 10, 1909), Kröning (Deutsche med. Wochenschrift, No. 46, 1909), and Weber (Zentralblatt f. Gynäkologie, No. 41, 1909) have tried the application of Momburg's bandage in controlling placental hemorrhage

during labor. Their experience shows that this method greatly lessens or controls such hemorrhage, but that it cannot be continued for a long time. In 2 of Sigwart's cases, which resulted fatally, autopsy showed that the abdominal viscera were not injured by the use of the bandage.

The good results claimed for section of the lower portion of the uterus as a means of emptying the uterus promptly, without dangerous trauma, have drawn attention to the value of these operations for placental separation. Dührssen and his followers have endeavored to apply this method, and claim for it a considerable success. The advocates of suprasymphyseal section advise its trial in patients in good condition. The merits of these operations for placental separation are not yet accurately known, nor is it positively ascertained that vaginal or suprasymphyseal section will giver better results than the classic abdominal Cesarean section.

In the present state of our knowledge we can summarize the treatment of placental separation when placenta prævia is not present as follows:

In patients in private houses, and not under the care of an obstetric surgeon the use of the tampon by the Rotunda method, with or without rupture of the membranes, will control the hemorrhage and give a reasonable chance for the mother. The survival of the child will be the exception and not the rule.

In cases where a diagnosis is made early, with mother and child in good condition, delivery by section, with hospital advantages, will give the mother the best chance for recovery, with a possible chance for the child.

Section should not be undertaken upon patients weakened by excessive hemorrhage and in generally bad condition. In performing the major operations general anesthesia should be avoided, and anesthesia by spinal injection, if possible, should be employed.

To be avoided as especially dangerous are rapid dilation and extraction through the vagina. Such cannot be done without general anesthesia; there is always with this treatment considerable hemor-

rhage during extraction; dangerous lacerations not infrequently occur; and postpartum hemorrhage is common and often fatal.

In the writer's experience, no cases have come under observation in sufficiently good condition to justify him in performing a major operation. The use of the tampon in cases where dilation had not begun has been reasonably satisfactory. Some of these cases do not come to the attention of the operator until labor has already begun, the cervix has been obliterated, and partial dilation is possible. Under these circumstances, if the membranes have not been ruptured, this should immediately be done and the uterus stimulated to contract by tonic doses of strychnin. When the uterus expels its contents, irrigation with hot sterile salt solution, with compression of the aorta through the uterine wall, with the hand within the womb, or externally by Momburg's method, will temporarily control the hemorrhage. The uterus should then be firmly packed and the vagina tamponed, and intravenous saline transfusion practised.

The writer has been successful by this method in apparently desperate cases.

Bibliography of Premature Detachment of Normally Implanted Placenta

Colclough: Journal of Obstetrics and Gynecology, 1902.
De Lee: American Journal of Obstetrics, 1909.
Edgar: Text-Book of Obstetrics.
Engström: Reports of Helsingfors Clinic, Berlin, 1908.
Goldstine: Surgery, Gynecology, and Obstetrics, February, 1910.
Goodell: American Journal of Obstetrics, vol. 2, 1870.
Herzfeld: Archiv f. Gynäkologie, vol. 82, p. 304, 1907.
Holmes: American Journal of Obstetrics, vol. 44, 1901.
Tweedy: Rotunda Reports, 1905–1909.

THE IMMEDIATE REPAIR OF LACERATIONS OF THE GENITAL TRACT

In parturition and in the artificial emptying of the uterus, as in therapeutic abortion for toxemia, lacerations of varying degree are not uncommon. It is impossible to estimate their frequency because it is difficult to obtain a precise statement as to what constitutes a laceration. A slight wound of the mucous membrane extending

through the fourchette may not cause hemorrhage and, under favorable circumstances, may be left to heal without suture, but even this invites infection, and under aseptic precautions may be closed to advantage. The closure of lacerations of the genital tract complicating labor may be immediate, intermediate, or late. By this we mean that the obstetrician may repair lacerations within a few hours after the birth of the child, or he may elect to delay from five to seven days after labor, or he may prefer to allow the patient to recover from childbirth, and several weeks or months after she has become convalescent, repair lacerations by a plastic operation.

The Immediate Repair of the Cervix.—At varying periods since the introduction of antiseptic precautions in obstetric practice, efforts have been made to immediately close lacerations of the cervix. In some instances these methods have been successful; in others the effort has been followed by the development of septic infection and by bad results. The writer was first led to close immediately the torn cervix in cases where hemorrhage called for the immediate application of sutures by the needle. Observing that in these cases hemorrhage was not only checked, but the cervix healed without complications, he was led to extend the application of sutures to the torn cervix where hemorrhage was absent. We have followed this procedure for some time in private, hospital, and out-patient practice, with the result that 80 per cent. of these cases have had good and primary union, 10 per cent. have had partial union, and 10 per cent. had no apparent result from the application of sutures. We have been unable to trace infection or other complications as the result of this effort to repair the cervix. We do not, however, believe that the immediate repair of the cervix should be undertaken except under antiseptic precautions and by those who have experience in obstetric surgery. The advantages to be gained by this method are better involution, a more prompt recovery from childbirth, and the avoidance of infection. In many of these cases the uterus has been tamponed to prevent or control hemorrhage, and the suture of the cervix has assisted in maintaining pressure upon the uterine vessels, while the presence

of the gauze within the uterus has in no way interfered with the closure of the torn cervix.

The technic of this procedure is essentially that described in suturing the cervix to control hemorrhage. With the patient in the

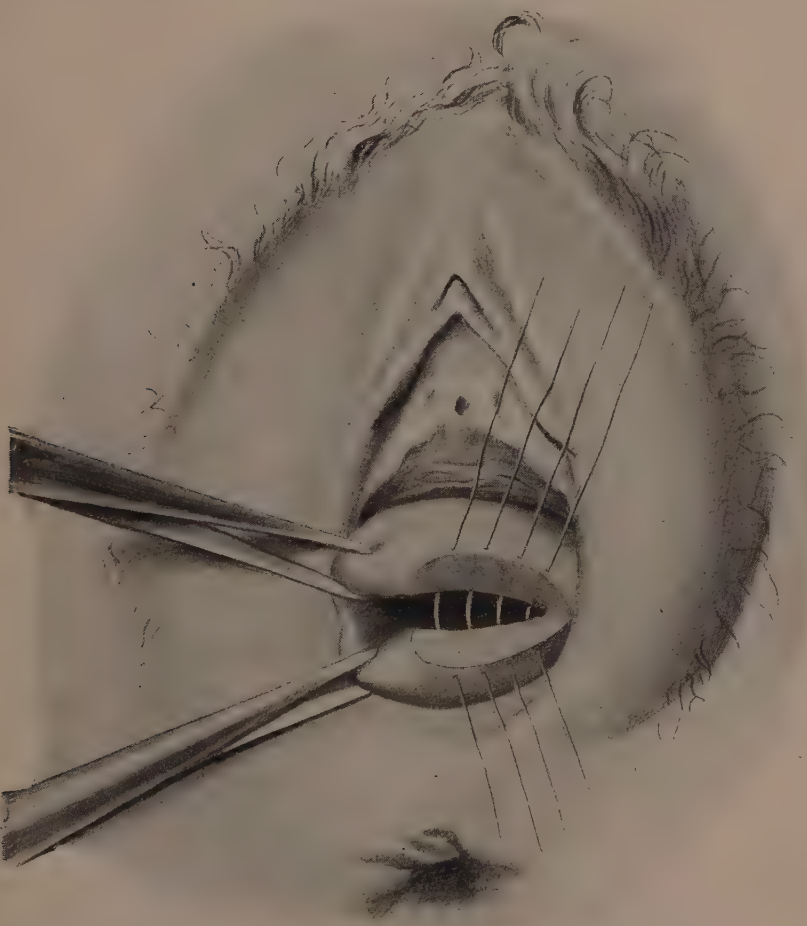

Fig. 236.—Closing a recent laceration in the left side of the cervix (Nagel).

dorsal position, and with a suitable light, the lips of the cervix are grasped by tenaculum forceps and drawn downward and the vulva retracted until the operator can examine the tear visually; or, if this

is impossible, until he can palpate it accurately with the thumb and finger. Especial care should be taken in introducing the highest, or first stitch. This should include entirely the torn tissue, and after it has been tied the long ends of the catgut may be left to serve as a guide for the succeeding stitches. The lacerations should be closed from above downward, leaving a small surface at the external os without suture. This will heal by the involution of the tissues and there will be no possible interference with the discharge of the lochia. Usually the greater tear is upon the left side, but if both sides are

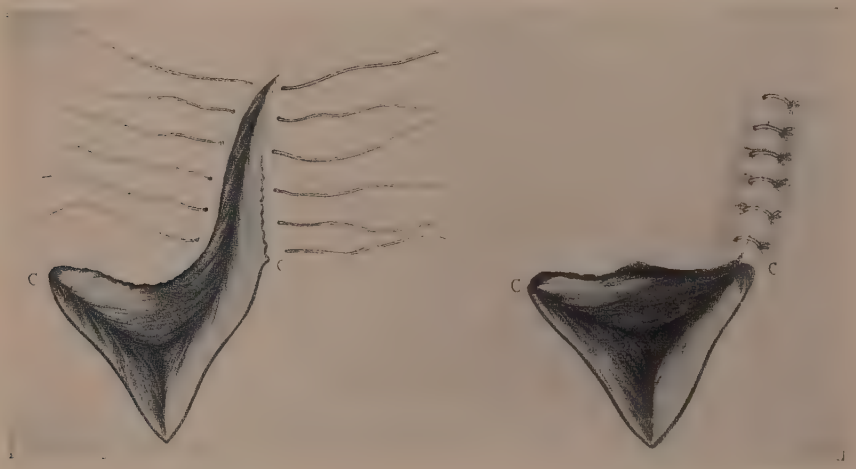

Fig. 237. Fig. 238.

Figs. 237 and 238.—Closure of deep laceration of perineum and pelvic floor: C, C, Posterior commissure (Bumm).

lacerated, both should be closed. Twenty-day catgut is usually employed, and we have seen no trouble follow from the retention of sutures after the puerperal period.

The Immediate Repair of Lacerations of the Posterior Segment of the Pelvic Floor and Perineum.—To properly perform this operation the obstetrician must keep in mind the fact that so far as the patient's future health is concerned the pelvic floor and the sphincter muscle of the bowel are of primary importance. The skin perineum is of secondary importance. In lacerations of considerable extent, although not complete, the tear reaches to the sphincter muscle and

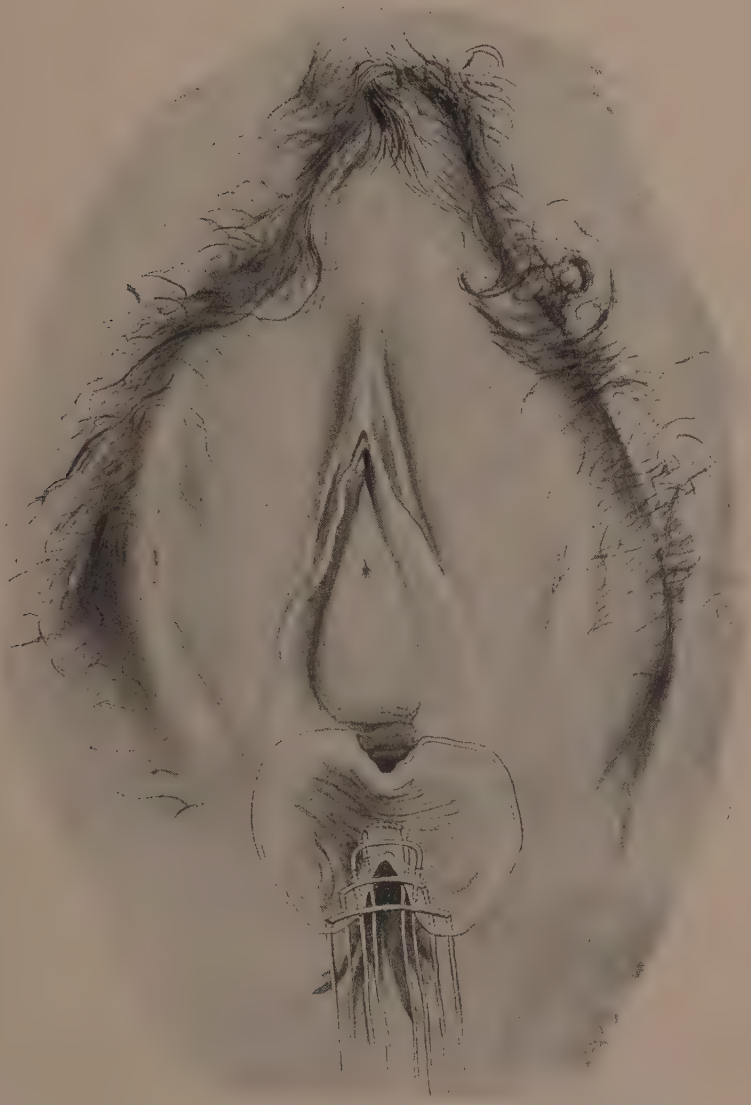

Fig. 239.—Complete recent laceration of pelvic floor; first step in repair, suturing the bowel (Nagel).

may wound some of its fibers. Unless this be kept in mind, and the muscle accurately closed, the patient will suffer as a consequence.

To accurately close such lacerations the patient should be upon

her back on the edge of a high bed or table, the lower limbs flexed upon the trunk and rotated slightly outward. As the hemorrhage which follows labor may be sufficient to obscure the field of operation, the vagina should be sponged out with sterile gauze and a moderate packing of sterile gauze placed over the cervix and in the posterior vaginal vault above the point of laceration. If the operator cannot clearly distinguish the highest point of the tear, he should introduce the longest finger of the gloved left hand, palm upward, into the rectum and raise the pelvic floor for inspection. Beginning

Fig. 240.—Complete recent laceration of the pelvic floor; second step, the rectum having been closed, the pelvic floor and vaginal wall are sutured: V, vaginal tissue; R, rectal tissue (Nagel).

at the highest point of the tear, stitches of No. 2 chromicized catgut should be inserted with a curved needle, encircling completely the lacerated tissues. The highest point of the tear should receive especial consideration, and the stitches should be passed deeply. In extensive lacerations the tear may extend deeply into the pelvic tissues, involving the uterosacral ligaments. It will be greatly to the patient's advantage if the operator can succeed in closing such lacerations through the vagina. Where they do not heal, the cervix tends to prolapse forward and retroversion is readily

established. Lacerations of the pelvic floor should be sutured from above downward to within ½ inch of the junction of the vaginal mucous membrane with the skin perineum. The two sulci of the pelvic floor should be thoroughly examined and each carefully closed. Care should be taken not to extend the sutures in the pelvic floor on to the skin perineum. If this be done, the pelvic floor will be pulled downward, the posterior vaginal wall will be shortened, and a tendency to rectocele and retroversion will be established.

When the pelvic floor has been sutured the operator should turn his attention to the sphincter muscle. If its substance has been injured the fibers should be brought together by stitches of No. 1 chromicized catgut completely buried. The sheath of the muscle should be closed separately and accurately. If the tear in the pelvic floor has been a deep one, at its deepest point buried sutures may be introduced and the superficial tissues closed above them.

Immediate Closure of the Perineum.—After the pelvic floor and sphincter muscle have received attention, the operator should begin at the lowest point of the perineal laceration. If the perineal tear be very deep, and especially if it be oozing, several buried sutures of catgut should be inserted. The skin edges should be brought together by interrupted stitches of sikworm gut, beginning at the point nearest the anus. Care should be taken to close this point accurately to prevent fecal matter from getting into the wound. The perineum is to be closed up to the point where the mucous membrane of the vagina meets the cutaneous surface. At this point the operator will have an opportunity to observe whether he has completely closed the pelvic floor, or whether he should insert additional stitches at the lower end of the pelvic-floor laceration. Usually it will be found best to close the skin perineum completely, and should the two lines of suture not meet, to insert from above one or two catgut stitches, completing the closure. If the laceration has been properly treated, the pelvic floor will be carried upward and backward, and when the repair is complete, the stitches in the pelvic floor will not be visible, and the lumen of the vagina will be restored to something like its original

proportions. If the sutures have been improperly placed, the posterior wall of the vagina will be dragged downward, the perineum will be shortened, and the orifice of the vagina considerably enlarged.

Some prefer to use chromicized catgut for closing the skin perineum. As these stitches will be constantly moistened with lochial discharge,

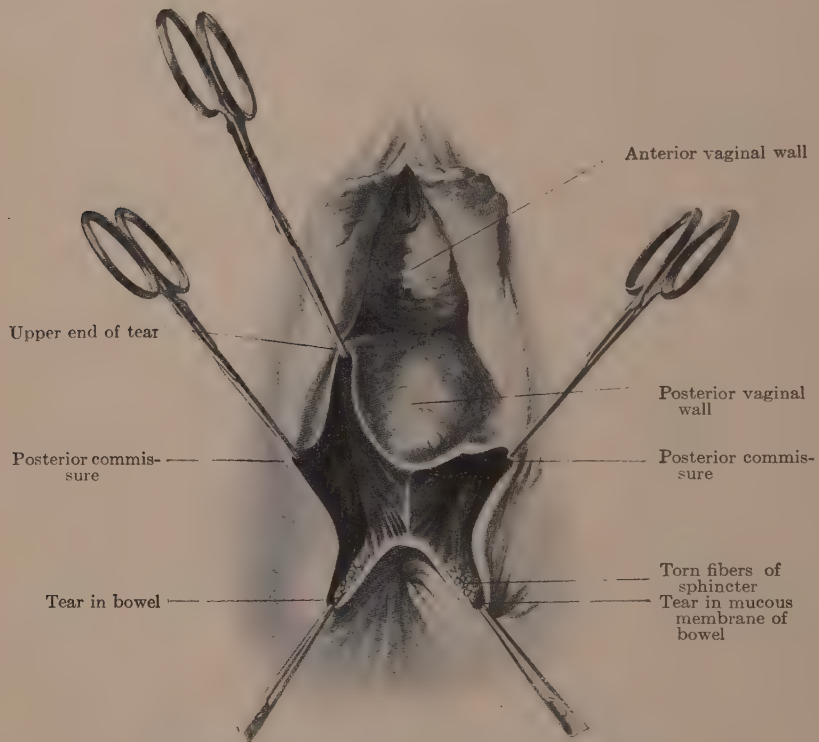

Fig. 241.—Complete laceration of perineum (Bumm).

and must be repeatedly cleansed by irrigation, it is more prudent to employ silkworm catgut upon cutaneous surfaces. These stitches may be left long and tied together and carried to one side of the vulva, or may be cut short, as the operator may elect.

The Immediate Closure of Complete Lacerations of the Pelvic Floor and Perineum.—In these cases the operator should carefully identify the mucous membrane of the rectum and the sphincter muscle. These should be brought together first, beginning at the highest point

of the rectal tear and using a continuous suture of No. 1 chromicized catgut for the rectal surface. The sphincter should be brought

Fig. 242.

Fig. 243.

Figs. 242 and 243.—Closure of tears in lateral sulci in complete laceration of perineum or edges of wound at anus (A, A): C, C, Posterior commissure (Bumm).

together with interrupted buried sutures, as already described. The operator should then turn his attention to the pelvic floor, inserting buried catgut sutures wherever required to build the tissue up firmly

Fig. 244.—Closing the rectal wall in complete laceration of the perineum. A, A, Torn bowel at anus; C, C, Posterior commissure (Bumm).

from the bottom. The pelvic floor and perineum may then be closed in the manner already described.

Immediate Closure of Lacerations of the Anterior Segment of the Pelvic Floor.—These may vary from slight lacerations requiring but a single stitch to deep lacerations at the side of the urethra, which may even include the urethra or, in some cases, the base of the bladder. In severe cases a catheter or sound should be placed in the urethra, to identify it, before suture is begun. Buried catgut sutures should be placed at the bottom of such tears and the surfaces brought accurately together by interrupted suture. If the urethra has been torn the wound should be closed with fine catgut, and the tissues over it separately brought together, and a permanent soft catheter placed in the bladder for drainage. If tears in the anterior segment open into the peritoneal cavity, as is sometimes the case after pubiotomy or

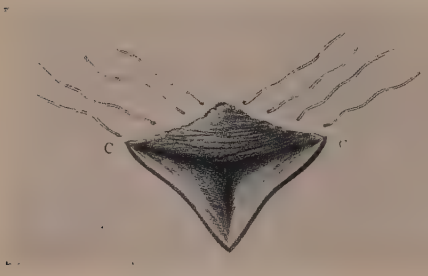

Fig. 245.

Fig. 246.

Figs. 245 and 246.—Closure of superficial laceration of perineum: C, C, Posterior commissure (Bumm).

lacerations following the use of Bossi's dilator, a strand of gauze may be carried through the laceration and left for several days as a drain. The greater part of the laceration may then be closed, leaving sufficient room for the extraction of the gauze. Deep tears in the vicinity of the clitoris may be accompanied by free bleeding. In these cases buried sutures will control the bleeding, while the edges should be accurately approximated above the buried sutures.

The Closure of Episiotomy Wounds.—After episiotomy a diamond- or lozenge-shaped surface remains for suture, the upper extremity of which is upon the lateral wall of the vagina, the lower extremity extending downward and outward through the skin surface of the labium and pelvic floor. Two lines of suture at right angles to each

other are necessary to close these wounds. As such are frequently of considerable depth, a line of buried sutures should first be inserted and the edges brought accurately together above it.

The Closure of Unusual Tears of the Perineum.—In cases where the mucous membrane of the vagina has been stripped upward from the perineum it is necessary to insert a circular row of stitches, restoring the parts to their original condition. If the presenting part has made

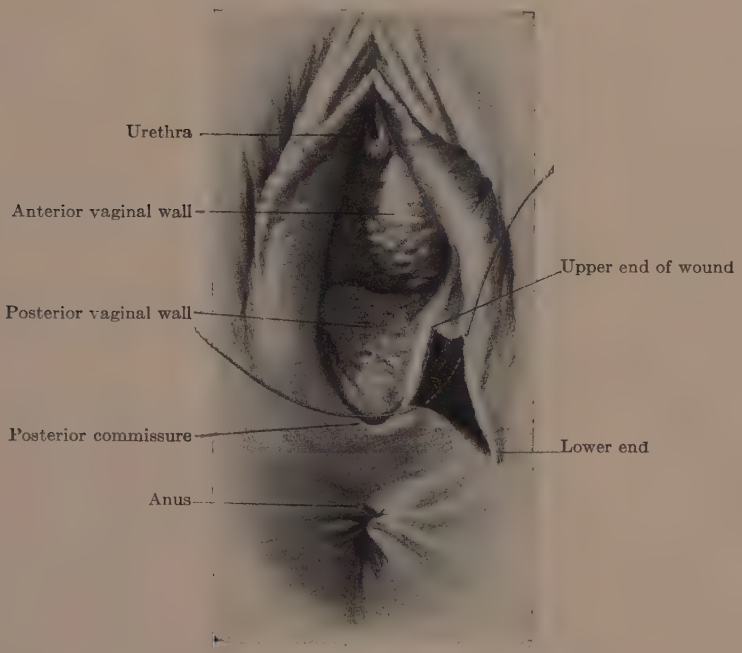

Fig. 247.—Closure of episiotomy wound (Bumm).

its way through the perineum, leaving the lower portion of the pelvic floor intact, the uninjured portion should be laid open in the median line, and the tear converted into one complete laceration. This should then be brought accurately together from the bottom upward.

Complications Following the Immediate Repair of Lacerations in the Pelvic Floor and Perineum.—The improper application of sutures in these wounds may be followed by dragging down of the posterior

wall of the vagina, shortening of the vaginal wall, shortening of the perineum, wounds of the urethra, imperfect closure of deep tears, leaving pockets for the accumulation of blood and lochial discharge, and extensive closure of torn surfaces, partially occluding the vagina and favoring the retention of lochia.

In the experience of the writer, two medical students on one occasion sewed together the greater part of the vulva in an effort to close a recent laceration. There is probably no operation of surgery whose proper performance is followed by more satisfactory results and whose inaccurate employment causes more distress and suffering. The common error consists in drawing the sutures too tightly in tying The tissues may swell somewhat for a day or two, although normal swelling rapidly decreases after labor. If the stitches are drawn too tightly the sutures will cut through and the wound will gape asunder. In an effort made to repair lacerations too completely the patient may be left in such a condition that in a subsequent labor extensive laceration may be inevitable. Judgment and experience are required to close accurately the essential portions of the birth-canal, thus securing for the patient permanent convalescence.

Accidents and Complications Following the Closing of Lacerations in the Birth-canal.—Infection in the stitches may develop within a day or two after their insertion. The tissues about the stitch become red and swollen, and pus gradually oozes near the stitch upon pressure. Stitches drawn too tightly through the skin surface especially will cause considerable pain and distress. When the stitches become infected they should be immediately removed, the tissues allowed to gape open freely, and irrigated with dilute antiseptic solution. If infected stitches are not removed, the infection may burrow beneath the submucous and connective tissues and a deep-seated abscess may result.

Bibliography of the Immediate Repair of Lacerations in the Genital Tract Occurring in Labor

Apfelstedt: Berliner klin. Wochens., No. 48, 1906.
Assareto: La Ginecologia, vol. 4, p. 423, 1907.
Coles: Surgery, Gynecology, and Obstetrics, November, 1906.
Davis: Progressive Medicine, p. 239, 1908.
Faivre: Zentralblatt f. Gynäkologie, p. 198, 1907.
Gaillard: L'Obstétrique, No. 7, 1909.
Guerdjikoff: Ann. di Ginecologia, April, 1907.
Küster: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 65, 1909.
Küstner: Monatsschrift f. Geburtshülfe und Gynäkologie, Bands 29 and 30, 1909.
Mayer: Zentralblatt f. Gynäkologie, No. 5, 1909.
Meyer: Inaug.-Diss., Giessen, 1907.
Ohn: American Journal of Obstetrics, p. 78, 1907.
Rudaux: Journ. d'Obst. et Gyn., September 20, 1907.
Sellheim: Münchener m. Wochenschrift, No. 37, 1909.
Sigwart: Zentralblatt f. Gynäkologie, No. 10, 1909.
Ulrich: Journal of Obstetrics and Gynecology of the British Empire, No. 4, 1907.
Utendörffer: Inaug.-Diss., Breslau, 1907.

THE INTERMEDIATE REPAIR OF LACERATIONS OF THE GENITAL TRACT OCCURRING IN LABOR

Hirst has drawn attention to the possibility of repairing lacerations occurring during labor in from five to seven days after the injury, and claims considerable advantage for this method. When the swelling and bruised condition so constantly seen immediately after labor has subsided and the patient has recovered from the fatigue and exhaustion of childbirth, the operator can secure the conditions essential for a successful operation, and the patient is in good condition for complete anesthesia. In carrying out this method no attempt is made to close lacerations immediately after labor unless hemorrhage is evidently coming from a torn vessel. Should this be the case, the vessel must be caught and tied or deep stitches passed to control it. The parts are kept aseptically clean and the general condition of the patient receives attention. When the tissues are in good condition the operator selects a favorable time and, under aseptic technic,

repairs the lacerations with complete anesthesia. If the torn surfaces have completely glazed over, they may be gently scraped with the blade of a pair of scissors or with a sharp curet, until they ooze slightly. The torn cervix is then first repaired, and afterward the segments of the pelvic floor and perineum.

It is claimed by those who advocate this method that the patient's puerperal period is shortened, that involution proceeds rapidly, that the operator is enabled to accurately close the wounds, and that wounds heal completely and without loss of substance.

The writer has not tried this method because closure within twenty-four hours after the occurrence of lacerations has given him good results, and he has hesitated to disturb the patient's puerperal period as late as the fifth or seventh day.

Bibliography of Intermediate Repair of Injuries to the Genital Tract

Hirst: Text-Book on Obstetrics.
Ischernoff: Inaug.-Diss., St. Petersburg, 1907.

THE LATE REPAIR OF LACERATIONS OF THE GENERATIVE TRACT

After a patient has recovered from childbirth with permanent lacerations of the generative tract, the question arises as to whether operation should be undertaken for the repair of such lacerations, when this had best be done, and to what extent should such lacerations be closed.

The necessity for the repair of lacerations will depend somewhat upon the fact as to whether the patient is or is not nursing her child. Complete anesthesia disturbs lactation for a short time, and the claim has been made that lacerations do not heal as promptly and soundly when lactation is in progress as when the operation is done in the absence of nursing. Unquestionably it is desirable, if possible, to operate upon a patient who is not nursing a child.

The time to be chosen for the repair of lacerations will depend considerably upon the condition of the patient's tissues. In cases with relaxed fiber with subinvolution the effort to perform secondary

repair by dissecting scar tissue, and possibly by making flaps, will be accompanied by free hemorrhage which may jeopardize the success of the operation. In the presence of subinvolution curcting the uterus is a dangerous procedure, as the curet is easily thrust through the softened uterine muscle. If the womb is in fair position and the patient's general condition is good, the operator should certainly delay until the tissues are sufficiently contracted to avoid severe hemorrhage.

The presence of infection contraindicates operation. If the patient recovers from childbirth with endometritis, this should receive proper treatment before the cervix is closed or incisions are made in the pelvic floor or perineum. A severe pelvic or general infection will be lighted up if this caution be disregarded. In patients recovering from septic infection the general condition is not good, and sound and prompt union cannot be expected after operation. In general, it may be said that the patient must have regained a fair degree of health, the tissues must not be hyperemic, and infection must be absent for secondary repair to be successful.

In choosing the method of operation the entire generative tract should receive attention. As subinvolution is often present, the uterus should be dilated, gently cureted, and packed with antiseptic gauze to stimulate its contraction. If the patient be a multipara, with an enlarged and badly torn cervix, amputation of the cervix is indicated.

If the cervix be in good condition the lacerated scar tissue should be removed and the torn edges brought in apposition and closed by chromicized catgut sutures. In women who have not passed the child-bearing stage the mistake must not be made of attempting the complete closure of the cervix. In our experience a patient had been operated upon for repair of the cervix, and the dissection and suture had been carried so far in the cervix as to encroach upon the site of the lower uterine segment. In a subsequent pregnancy placenta prævia was present, and dilation of the cervix to perform version or deliver the child was very difficult by reason of the previous closure, and severe laceration into the lower uterine segment was

prevented with great difficulty. We have repeatedly seen the cervix tear extensively after its complete repair. In women who have not passed the child-bearing period the cervix should be repaired sufficiently to prevent its chronic congestion and degeneration, but not so completely as to make a subsequent dilation difficult.

The Late Repair of the Pelvic Floor.—It is interesting to observe that the only practically successful and satisfactory operation for the secondary repair of the lacerated pelvic floor is based upon the correct closure of recent lacerations. The value of the Emmet denudation lies in the fact that it reproduces the original lacerations in the vagina, sulci, and levator ani muscle. Keeping this fact in mind, the obstetrician can plan the extent of the denudation after Emmett's method in accordance with the conditions present in each case. Remembering that the original tear occurs most frequently upon the left side, it is usually necessary to carry the denudation higher upon the left than upon the right side. The apex of each denudation should extend to the highest point in the vaginal sulcus where prolapse of the tissues and rectocele are present. It is sometimes difficult to reach this point successfully, and in extensive injuries the denudation should be deep enough to take in the fascia forming the ureterosacral ligaments. The insertion of sutures of silkworm gut should begin at the apex of each denudation, and the operator can judge of the effect in his operation by observing the degree to which the pelvic floor is raised and the posterior vaginal wall brought upward toward the anterior vaginal wall as the sutures are tied.

In denuding for the repair of the perineum the operator should first examine carefully the sphincter muscle of the bowel. If this be sound, less extensive denudation is required than where the muscle or its fascia has been torn and is permanently relaxed. If the sphincter requires attention, sufficient dissection should be done to expose its fascia and, if possible, its severed muscular fiber. These ends should be denuded and the sphincter and its fascia closed separately with buried stitches of medium-sized catgut. In cases of extensive denudation the perineal body must be built up by buried catgut

stitches as the operator proceeds. The placing of Emmet's crown stitch depends upon the degree of laceration present, and should be left until the last, as in the repair for recent laceration the operator waits until the end of the operation before bringing the sutures in the pelvic floor to meet the line of suture in the perineum.

It is impossible to describe minutely the technic requisite in each case, but the obstetrician who is skilled in closing recent lacerations will have little difficulty in adjusting the same principles to the secondary and late repair.

In patients in fair general condition it should be possible to dilate and curet the uterus, amputate or close the cervix, and repair incomplete lacerations of the pelvic floor and perineum at one sitting. Should there be an extensive complete laceration, with extensive tear of the cervix as well, with laceration of the anterior segment of the pelvic floor, in a patient who is in bad condition, it may be necessary to divide the operation, closing the cervix and anterior segment at one sitting, and reserving the posterior segment of the pelvic floor for a second operation.

The Secondary Repair of Complete Lacerations of the Pelvic Floor and Perineum.—In these cases, as in the incomplete, the operator must first reproduce essentially the anatomic conditions present after the recent laceration. As the mucous membrane of the rectum has atrophied and retracted, it would be necessary to replace it by flaps formed by dissection. As in the recent complete laceration the operator first closes the torn rectal wall, so in the secondary operation the operator first forms a new rectal wall by flap dissection, and then proceeds to close it essentially in the same manner as in the recent case. It is especially important in these cases that the remnants of the sphincter muscle be identified and freely loosened from their retracted condition by dissection. When this has been done the sphincter may be re-formed with buried sutures of catgut. Although it may be difficult to identify muscular fiber in its atrophied condition, experience shows that if even a portion of the muscular fiber can be secured, and the fascia be properly closed, a serviceable sphincter may

be formed. After the rectal wall and sphincter muscle have been restored, the vaginal sulci and pelvic floor may be repaired in accordance with the anatomic condition present. The extent to which the perineal body can be restored will depend upon the degree of atrophy present. The operator must remember the comparative unimportance of the perineal body in maintaining the integrity of the genital tract. It is a mistake to attempt to re-form the perineum where the tissue has been greatly atrophied, and the effort to do so will cause tension upon the stitches which may jeopardize the success of the operation.

The Secondary Repair of Lacerations of the Anterior Segment of the Pelvic Floor.—Prolapse of the anterior vaginal wall with cystocele may be satisfactorily corrected by the denudation of an oval surface whose size depends upon the degree of laceration and prolapse which is present. If the tissues about the urethra have been torn and the urethra has sagged downward and forward, this condition will not be entirely corrected by operation upon the anterior vaginal wall only. Should the latter be too extensively carried out, it would draw the urethra upward and backward and might cause the patient considerable discomfort.

To correct prolapse of the urethra the anterior vaginal wall may be repaired, and this should be accompanied by bilateral denudation at the sides of the urethra, and the closure of these surfaces by sutures inserted almost at right angles to those which close the denuded surface in the anterior vaginal wall.

Bibliography of the Late Repair of Lacerations of the Genital Tract

Ahlfeld: Deutsche med. Wochens., No. 51, 1907.

Anspach: American Journal of Obstetrics, December, 1906.

Barry: The Lancet, November, 1906.

Baum: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 4, 1905.

Brickner: American Journal of the Medical Sciences, No. 425, 1907.

Child: Journal of Obstetrics and Gynecology of the British Empire, November, 1905; American Journal of Obstetrics, October, 1906.

Dührssen: Gyn. Rundschau, Heft 2 and 8, 1907.
Goffe: American Journal of Obstetrics, October, 1906.
Hall: Surgery, Gynecology, and Obstetrics, February, 1909.
Holden: American Journal of Obstetrics, October, 1905.
Jacobs: Zentralblatt f. Gynäkologie, No. 9, 1908.
Küstner: Monatsschrift f. Geburtshülfe und Gynäkologie, Heft 2, 1908.
Meyer: Dissertation, Giessen, May, 1907.
Nagel: Archiv f. Gynäkologie, Band 75, Heft 2, 1905.
Paramore: British Medical Journal, February 6, 1909.
Watkins: Surgery, Gynecology, and Obstetrics, February, 1909.

THE CORRECTION OF UTERINE DISPLACEMENTS FOLLOWING LABOR, WITH OR WITHOUT LACERATIONS

In many cases retroversion or exaggerated anteversion with prolapse are distinctly caused by lacerations. Under these circumstances the repair of lacerations will be followed by the correction of the uterine displacement.

To further this, after the patient has recovered from operation, the uterus should be raised in the pelvis, and, if necessary, anteverted by the knee-chest posture, accompanied, if necessary, by the temporary use of the antiseptic wool tampon or a carefully fitted soft-rubber pessary. If, however, the correction of subinvolution and the repair of lacerations does not improve the position of the uterus, abdominal section may be performed and the malposition corrected by operation upon the round ligaments or upon the round ligaments and broad ligaments. Theoretically the ureterosacral ligaments should also receive attention in such sections.

Practically, the writer has not found it satisfactory to attempt such intra-abdominal repair. The intraperitoneal shortening of the round ligaments by Gilliam's, Baldy's, or other methods should be selected, the operator choosing that form of operation which is best adapted to the anatomic condition present. The writer has had good results by shortening the round ligaments by the method described and practised by Dudley. If the operator is satisfied that this operation is necessary, it may be advantageously performed following cureting of the uterus and repair of the cervix. The repair

of the pelvic floor and perineum may be included at the same sitting or may be deferred to a subsequent operation. Intra-abdominal correction of uterine displacements may be practised after labor as soon as involution is fairly well advanced and the patient has recovered from the exhaustion of labor. It should be included among obstetric operations, and is as appropriate a part of obstetric surgery as the repair of lacerations.

The Correction of Prolapse of the Pelvic Viscera Following Labor.—Where extensive lacerations of the generative tract are present, with subinvolution, the correction of these conditions must precede operation for prolapse. In severe cases the operator must decide whether the patient's interests will not best be served by sacrificing the uterus rather than by attempting to retain it in position. If the patient is approaching the menopause it may be best to remove the body of the uterus with the tubes and ovaries, bringing together the peritoneal surfaces of the broad ligaments in such a manner as to sustain the stump of the uterus at the summit of the vagina and prevent prolapse of the vaginal walls. If the patient declines to sacrifice the uterus, and further conception is unlikely, ventrofixation may be performed following the closure of lacerations.

Polk[1] describes and illustrates a suprapubic operation on the pelvic floor for prolapse of the uterus. The operation consists essentially in opening the ureterovesical space, separating the bladder from the vagina, pushing aside the ureters, and exposing the anterior wall of the vagina beneath the bladder. The anterolateral lines of the vagina are then united with continuous kangaroo tendon sutures on each side from below upward, beginning as far down as possible, and uniting below the upper end of the original incision. The bladder is held forward with a retractor. The fascia of the peritoneum covering the sides of the bladder, the vagina, and uterus is now united in the median line, the ureters and uterine arteries being left outside the sutures. The ureterosacral ligaments are then shortened at the junction of the inner and middle thirds. If the uterus be retained, the

[1] American Journal of Obstetrics, vol. 60, No. 3, 1909.

round ligaments may be shortened in addition. If the uterus be senile, it may be thrown forward and the fundus held in the sulcus behind the bladder by passing the sutures through the round ligament at each cornu. If the uterus is removed, the cut surfaces of the stump are stitched together in the line of the original incision. After closing the abdominal wound, if necessary, the perineum may be repaired in the lower portion of the posterior vaginal wall.

In a patient presented for examination upon whom this operation had been performed, the vagina had a normal depth and the neck of the uterus was encircled by a plastic infiltration which was not painful upon pressure. The patient's prolapse had been cured.

In some cases of prolapse the operator's ingenuity may be taxed to the utmost to secure a favorable result. In women who have long-continued nervous strain and are badly nourished the entire muscular and elastic tissues of the body are so wasted and relaxed that there seems to be no point from which to form supporting tissue. The broad ligaments share in the general relaxation and atrophy, and it may be practically impossible to prevent prolapse.

Bibliography of Operations for Displacement and Prolapse

Barrett: American Journal of Obstetrics, June, 1907; Surgery, Gynecology and Obstetrics, April, 1908.
Besserer: Zentralblatt f. Gynäkologie, No. 19, 1907.
Bourcart: Ann. de Gyn. et d'Obst., December, 1907.
Coffey: Surgery, Gynecology, and Obstetrics, October, 1908.
Dührssen: Gyn. Rundschau, Heft 2, 1907.
Discussion, British Medical Association: British Medical Journal, October 1, p. 283, 1908.
Haupt: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, 1907.
Hill: American Journal of Obstetrics, May, 1907.
Küstner: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, 1907.
Macray: Archiv f. Gynäkologie, Band 88, Heft 3, 1909.
Martin: Surgery, Gynecology, and Obstetrics, February, 1907.
Sippel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, 1907.
Strassmann: Berliner klin. Wochens., No. 33, 1907.
Taylor: Journal of Obstetrics and Gynecology of the British Empire, December, 1907.
Tillmann: Beiträge zur klin. Chir., Band 55, 1907.

DIASTASIS OF THE RECTI MUSCLES AND RELAXATION OF THE ABDOMINAL WALL FOLLOWING LABOR

These conditions are most commonly seen in anemic multiparæ who have born children rapidly with insufficient recovery after labor. If the condition be extreme, every effort must be made to build up the patient's general health and, if possible, to bring about an improved condition in the muscles of the abdominal wall by gentle massage. At operation the redundant skin and fascia may be excised, the upper and lower fascia of the recti muscles identified and isolated, and separately closed with buried catgut stitches. If hernia has developed, the contents of the hernia must be replaced, the sac excised, and its edges accurately approximated.

THE TECHNIC OF OPERATIONS FOR THE REPAIR OF LACERATIONS AND THE CORRECTION OF DISPLACEMENTS

The tissues of the cervix, pelvic floor, and vagina may be rendered in better condition for operation by douches, twice daily for several days, with 1 per cent. lysol. If catarrh of the bladder be present the bladder may be irrigated once daily with dilute argyrol or salt solution. Where complete laceration of the perineum must be corrected, the bowel should be thoroughly emptied several times before operation and the rectum irrigated daily with salt solution.

Operators generally agree in closing the surfaces covered with mucous membrane by a catgut or kangaroo tendon suture. Chromicized catgut lasts sufficiently long to permit the healing of the torn cervix and has largely replaced silver wire. Some operators prefer to use this also in repairing the cutaneous surfaces of the perineum. In the Emmet operation many operators prefer silkworm gut because the sutures are difficult to cleanse perfectly after operation and silkworm gut does not become infected. The kangaroo tendon is especially appropriate for continuous suture in peritoneal surfaces where the suture is to remain for some time, acting as a splint for the tissues. Silk is rarely used except in some cases of ventrosuspension where the operator prefers to unite the uterine and abdominal peritoneum with buried stitches of fine silk.

Improvements in obstetric surgery have greatly simplified the technic of these operations. Dissection with blunt-pointed scissors can be rapidly effected with comparatively little hemorrhage, improved appliances for lighting the field of operation, and better facilities for placing the patient in a favorable position, have rendered the performance of these operations much more simple and satisfactory. The universal adoption of antiseptic precautions with aseptic care of the patient has rendered the occurrence of infection rare, while hemorrhage of gravity during or after these operations very seldom occurs. The after-care of patients operated upon for laceration of the pelvic floor and perineum requires skilful nursing and especial precautions to avoid the infliction of injury upon the patient. Stitches in the pelvic floor should be cleansed by pouring sterile or antiseptic solutions upon them. The insertion of the finger, gauze, or cotton within the vagina should not be permitted. Some operators prefer in addition the use of a dusting-powder of iodoform and boric acid after irrigations of antiseptic solutions.

The After-treatment of Complete Lacerations of the Pelvic Floor.—After repair of the complete laceration of the pelvic floor and perineum especial attention must be given to the condition of the bowels. On waking from ether such patients sometimes complain bitterly of pain in the rectum and about the anus. If this suffering be not promptly controlled, the patient may strain severely and tear asunder the sutured surfaces. Such pain must be promptly held in check by opium, given as morphin hypodermically or in suppositories inserted into the bowel. If the patient has considerable pain after operation she should have sufficient opium to keep her comfortable. If she has been thoroughly prepared the bowels need not move for two or three days after operation for the complete tear. The patient should take some laxative which will soften the fecal matter, such as castor oil or compound licorice powder, and should be instructed to warn the nurse when she feels a desire to empty the bowels. From 8 ounces to a pint of warm sterile olive oil should be carefully injected by a large soft-rubber catheter as high in the bowels

as possible. After the fecal matter has been passed the bowels should be gently irrigated with warm sterile salt solution. After the initial movement the bowels should move daily or every two days.

Bleeding and Infection After the Repair of Lacerations.—Should hemorrhage occur after secondary operations for repair, the operator must locate, as far as possible, the site of the hemorrhage. This may not be easy to accomplish, for blood may ooze from a point high up in the tissues and form a considerable accumulation in the surrounding cellular tissue. If the bleeding is not extensive, an effort may be made to check it by tamponing the area of operation with 10 per cent. iodoform gauze with the application of a large pad of gauze over the vulva. By this means the operator may try to avoid removing the stitches, hoping that the extravasated blood will gradually clot and subsequently be absorbed. If the hemorrhage is considerable and can be traced to its source, it may be necessary to remove one or more stitches to secure a bleeding vessel, and again close the incision.

In the rare event of infection following these operations the stitches should be freely removed and the parts copiously douched with dilute antiseptic solutions and powdered with iodoform and boric acid.

The Patient's Convalescence After the Repair of Lacerations.—An opportunity should be taken after these operations to correct the patient's anemia by iron, arsenic, a suitable diet, and by general massage. Where excretion is habitually deficient this should receive proper stimulation. The patient's recovery will be but partial if the general health does not receive adequate attention.

THE SURGERY OF PUERPERAL SEPTIC INFECTION

While antiseptic precautions have greatly lessened puerperal septic infection in hospital practice, the fact that many general practitioners do not efficiently employ antiseptic precautions in obstetric practice gives rise to a considerable number of such cases. The performance of criminal abortion, the care of obstetric patients by

incompetent midwives, and the previous existence of gonorrheal and syphilitic infection contribute to the number of these cases.

Emptying the Septic Uterus.—In the presence of puerperal septic infection the interior of the uterus has been at some time involved. The decision to explore the uterine cavity with the hope of removing retained tissue must be made in accordance with the conditions present. The operator is called to a patient recently delivered with offensive lochial discharge, an enlarged, slightly softened and slightly tender uterus, and it is quite probable that retained portions of placenta, membranes, or blood-clot are still present. If, however, he sees his patient a week or ten days after labor, finding no excessive discharge from the uterus, but a colorless dark prune-juice fluid, with symptoms of streptococcus infection of the blood, the uterus fairly well involuted and the cervix almost closed, it is doubtful whether the interior of the uterus requires exploration. It is probably safer to explore all septic uteri once as soon as possible after the case is seen, unless the conditions are such that this exploration will add to the patient's shock and may increase the absorption of streptococci into the blood-current.

The exploration and emptying of the septic uterus is an operation requiring judgment, patience, and oftentimes considerable skill. The operator must remember that the conditions are peculiarly favorable for puncture of the uterine wall. The uterine muscle is softened, especially at the area where the placenta was attached, which is frequently the site of infection, and may be in a partially necrotic condition. Hence all sharp-pointed instruments should not be introduced within the uterine cavity. For exploratory purposes the fingers of the gloved hand are safest. A large blunt-edged spoon curet with a hollow handle serves the double purpose of exploring the uterine cavity and of introducing a gentle current of antiseptic fluid. Swabbing out the interior of the septic womb with sterile gauze in the grasp of uterine dressing forceps is preferred by some. This is essentially the method of the French, who cleanse the puerperal womb with an aseptic brush rotated within its cavity.

To explore and empty the puerperal septic uterus, anesthesia is required if the uterus is very sensitive to pressure and the patient excitable and suffering pain. Some septic patients are so apathetic that the operation may be done without anesthesia. As the cervix is sometimes partially closed in these cases, the operator must be prepared to dilate it with the fingers or with solid dilators. After suitable preparation the cervix is dilated sufficiently to admit one or two fingers, the uterus pressed gently downward, and the uterine wall explored by touch as completely as possible. If a piece of retained placenta be found it should be brought away. If there be no retained placenta, but an abundance of affected decidua, and the operator can find no point of rupture in the uterus, the uterine wall should be gently scraped with a blunt curet. When the operator is satisfied that the uterus has not been punctured, its cavity should be gently irrigated with hot salt solution or 1 per cent. lysol. The cavity may then be packed to advantage with 10 per cent. iodoform gauze, serving the double purpose of exciting uterine contraction, promoting drainage, and exercising an antiseptic influence upon the bacteria within the uterus. In cases of severe streptococcus infection this manipulation may be accompanied or followed by severe uterine hemorrhage. This requires the firm use of the gauze tampon and the administration of strychnin, ergot, and adrenalin. The gauze tampon has the added advantage that its pressure promotes the loosening and subsequent discharge of pieces of retained placenta or membrane. The gauze is removed from forty-eight to seventy-two hours after its insertion. Should the operator find that he has punctured the uterus during this manipulation, he must decide whether to open the abdomen or whether he can deal safely with the condition without such procedure. If no fluid has been employed within the uterus, and the finger or curet has been thrust through the uterine wall at one point only, the operator must introduce a strand of iodoform gauze through this aperture, draining the uterus with iodoform gauze, and hoping to avoid the necessity for section. If, however, fluid has escaped through the puncture in the wall of the uterus,

abdominal section is safer, followed by drainage through the vagina or through the lower portion of the abdominal incision. Extensive rupture of the uterus with bleeding may render hysterectomy necessary. When the gauze packing has been removed from the septic uterus, it should be gently irrigated with salt solution or dilute lysol, and after this the uterine cavity should not be disturbed.

No more serious mistake can be made in dealing with septic cases than the repeated use of intra-uterine or vaginal injections. Once is quite sufficient to interfere with the uterine cavity.

Hysterectomy for Puerperal Septic Infection.—Septic metritis following labor suggests hysterectomy followed by free drainage of the pelvic cavity. This procedure received a thorough trial, when abdominal surgery was first extensively practised. The majority of obstetricians came to the conclusion that to be successful this operation must be performed so early that the operator could not be sure of its absolute necessity. If delay was practised until other methods had failed, the operation was done too late and hastened the patient's death. Recently hysterectomy for puerperal septic infection has been revived, but has not been widely accepted.

In performing the operation one of two methods may be chosen. If the infection be recent, the general peritoneum not involved, and no focus of infection be detected in the pelvis or broad ligaments, the operator may remove the body of the womb with the Fallopian tubes and one ovary, leaving the remaining ovary to prevent a premature menopause. The pelvic cavity should be drained after this operation by a strand of gauze passed behind the stump of cervix through the vagina or through the lower end of the abdominal incision.

If the condition of the patient does not justify an operation requiring as much time as hysterectomy with intraperitoneal treatment of the stump, the Porro operation may be selected, leaving the uterine stump at the lower end of the abdominal incision and closing the peritoneum accurately around the stump.

The Complete Extirpation of the Septic Uterus.—Some operators prefer the complete extirpation of the septic uterus to hysterectomy.

This may be done through the vagina in multiparous women in whom the vagina has been repeatedly distended. In primiparous women the complete extirpation of the uterus may best be accomplished by abdominal section, followed by drainage of the pelvic cavity with iodoform gauze inserted from above downward. The retention of one or both ovaries will depend upon the age of the patient, and must be decided in accordance with the circumstances of each individual case.

Some aid may be obtained in making a decision to select or reject hysterectomy by the bacteriologic examination of the uterine lochia, and the bacteriologic examination of the patient's blood. If streptococci be present in the blood it is too late to perform hysterectomy, and the patient's chance for recovery will be lessened by the operation. If the blood is sterile, and the uterine lochia shows the abundant presence of several varieties of pathogenic bacteria, a mixed uterine infection may be diagnosticated and hysterectomy may improve the patient's condition. The presence of fibroid tumors in the wall of the septic uterus requires hysterectomy, as infection in these cases is especially dangerous.

The Surgical Treatment of Pelvic Thrombophlebitis.—The excision or ligation of thrombosed and infected veins of the broad ligament proposed by Trendelenburg is now recognized as a justifiable procedure in the early stages of puerperal pyemia. The theory of this operation is the prevention of the absorption of bacteria and toxins from the infected thrombi by ligating the continuity of the vein, thus checking the blood-stream at this point. The excision of infected veins after ligation removes foci of infection.

The symptoms indicating this procedure are chills, followed by high fever, rapid pulse, and general symptoms of puerperal infection. On vaginal examination the large veins can be made out like cords beneath the mucous membrane. Peritonitis may be present, making the examination difficult and painful.

The operation is performed by opening the abdomen, exposing the infected veins, and passing chromicized catgut ligatures beneath them

as high in the broad ligaments as possible. If the conditions are favorable the thrombosed portions of the veins may be removed. Unless pyosalpinx has definitely developed, it is well to limit the operation to the ligation of the veins only.

If the operation has done good, the patient's chills grow less and finally cease, the temperature and pulse sink, and the patient's general strength increases. There will remain, however, considerable thickening in the tissues of the broad ligament at the site of ligation.

The Surgical Treatment of Thrombophlebitis of the Lower Extremity (Milk Leg).—This most common form of phlebitis following labor may be divided into two classes: In the first are those cases in which the source of infection cannot be traced, in which little, if any, rise of temperature occurs, and in which surgical interference is not necessary. In these patients there is moderate tenderness only over the vein or veins involved, the lower extremity is but moderately swollen, and the tension on the skin and fascia is not excessive. In some cases fever is absent and the constitutional disturbance is very slight.

With these patients elevation of the lower extremity, the application of lead-water and laudanum over painful areas, and bandaging the lower extremity from the toes to the groin are sufficient. Convalescence proceeds steadily, and recovery follows in from two to three weeks.

In severe cases tenderness and pain at the site of the thrombosis are pronounced, the patient has considerable fever, swelling of the lower extremity is well marked and accompanied by considerable pain, the subcutaneous tissue may become infected, and phlegmon may develop. Multiple incisions in the lower extremity may be indicated for the purpose of draining the infected serum and pus. In extreme cases sloughing to a greater or less extent takes place. It may be necessary to insert drainage-tubes through various portions of the thigh, and the patient's recovery is prolonged and tedious.

The site of infection in these cases, whether they be slight or severe, is undoubtedly the uterine wall where the placenta has been

attached. The blood-stream has become infected and the thrombosis is determined by the anatomic conditions present.

Pelvic Abscess.—In cases of mixed infection which spread from the vagina and cervix into the pelvic tissues, pelvic abscess may develop. If left without interference and the patient's resisting power proves sufficient to encapsulate the abscess, it may finally burst into the rectum, the bladder, or into the vagina. Such a result should not be awaited, but as soon as bogginess and obscure fluctuation develop in the posterior vaginal fornix a free incision should be made and the pus allowed to escape freely. The abscess cavity should not be irrigated to avoid the danger of spreading infectious material into the peritoneal cavity. The fingers of the gloved hand may cautiously explore the abscess and, if it be thoroughly walled off and pyosalpinx be present in the abscess wall, the pyosalpinx may also be incised and allowed to drain through the vagina. A drainage-tube may be inserted, and later a gauze drain, until the abscess has completely emptied itself and the cavity is well-nigh closed by granulation. If the patient's infection be severe she should be placed in Fowler's position and saline fluid introduced freely into the circulation by the Murphy method or by intravenous saline transfusion. In draining such an abscess every precaution must be taken not to open its wall upon the abdominal aspect, to avoid infecting the peritoneum. No attempt should be made in these cases to perform a complete operation upon the uterus, tubes, or ovaries until the local infection has entirely subsided. When this result has been secured and the general condition of the patient is good, the abdomen may be opened, adhesions loosened, diseased tubes or ovaries removed, or the pelvis cleared by removal of the tubes and ovaries, including the body of the uterus. Should this operation be undertaken too early the manipulation necessary will cause general peritonitis, which often proves rapidly fatal. Should the patient recover from the pelvic abscess, retaining the tubes, ovaries and uterus, adhesions may form, limiting the mobility of the pelvic viscera and interfering with subsequent pregnancy and labor.

In this connection mention must be made of Pryor's method of treatment, which consisted in incising the posterior vaginal fornix widely, emptying collections of pus, loosening adhesions, and filling as far as possible the pelvic cavity with layer upon layer of iodoform gauze. This was allowed to remain for several days, acting as a drain and as a local antiseptic as well. Pryor's treatment in appropriate cases was efficient and gave satisfactory results. In his observations iodin could be detected in the urine of the patient shortly after the insertion of the gauze and undoubtedly acted as the essential antiseptic agent.

Puerperal Peritonitis.—This serious form of puerperal sepsis is recognized as among the most dangerous varieties of peritonitis. It may follow the gradual development of severe septic infection from a focus usually in the cervix, the infection spreading through the endometrium to the tubes, to the peritoneum covering the uterus, and thence to the general peritoneum. In its severest form the patient's power of resistance is often so slight that no reaction is manifest. The pulse is weak and rapid, the temperature sometimes subnormal, the abdomen not greatly distended or flat, and the patient's general condition that of profound infection. On opening the abdomen of such a patient pus will be found in considerable quantity, and the peritoneum and intestines coated with yellowish-gray lymph. The infection is usually of a mixed nature, streptococci and staphylococci being abundantly present, and often the Bacillus coli communis in addition. Such a condition frequently follows the bursting of a pyosalpinx filled with virulent pus, and is often one of the complications following criminal abortion. In the experience of the writer, a young woman who had suffered from criminal abortion had symptoms of pyosalpinx. After slight exertion she was suddenly taken with diffuse abdominal pain, shock, subnormal temperature, and rapid pulse. On arrival at the hospital her condition was so grave that operation could not be undertaken. Autopsy showed a bursted pyosalpinx and virulent general peritonitis.

In patients whose strength suffices to offer resistance to infection,

puerperal peritonitis develops gradually, with pain, fever, and altered pulse, distention of the abdomen, and gradual interference with intestinal peristalsis. Although the peritoneum is altered, it retains sufficient vitality to form adhesions, which often tend to limit the spread of infection. If pus forms, it is in those localities where a collection of fluid becomes most readily encapsulated. In patients of great physical strength such peritonitis may subside before pus forms and the patient make a prolonged recovery. Much can be done for these patients by the continuous use of dry cold upon the abdomen, moderate purgation, tonic doses of strychnin and alcohol, with the careful use of opium if the pain be severe. Operation is not indicated so long as the patient is resisting the infection and the symptoms are not severe.

The surgical treatment of puerperal peritonitis must be conducted with a view to securing drainage with the least possible disturbance of the inflamed viscera. Where the infection is profound, operation is rarely successful. In the most acute stages of puerperal peritonitis operation may do harm by spreading infection from a focus which is being walled off by adhesions or exudate. When, however, sufficient time has elapsed for the patient's resisting power to have done what it could, and the patient is threatened with further infection, operation should be at once undertaken.

Although pelvic abscess may not be present in general puerperal peritonitis, we believe that drainage through the vagina is indicated. In our experience, good results have followed the opening of the abdomen in the median line with a thorough but careful, examination of the pelvic viscera. Adhesions should be carefully loosened, collections of pus opened, and during this procedure the general peritoneal cavity walled off as far as possible with gauze. If the uterus is dislocated, it should be brought as nearly as possible into a normal position above the pelvic brim. The posterior vaginal fornix being freely opened, 10 per cent. iodoform gauze is packed lightly into the pelvic cavity between the inflamed organs in such a manner as to drain the broad ligaments and pelvis from the brim downward. This gauze should emerge through the vagina.

The region of the appendix should also receive attention, and if abscess in this location be present, it should be separately drained by a tube or wick of gauze emerging through the abdominal wall from the right lower segment. If the operator believes that the general peritoneal cavity should be drained as far as possible, he may also insert wicks of gauze or rubber drainage-tubes through the left lower abdominal wall and also through the abdominal wall of both sides in its upper portion. It is best to avoid the introduction of saline fluid directly into the abdominal cavity. Great benefit will follow the continuous instillation of saline fluid into the rectum by Murphy's method, or the regular injection of saline fluid in quantities of 6 or 8 ounces carried as far as possible into the bowel. The abdominal incision may remain open and drainage at this point be also effected by the use of gauze. The patient's shoulders should be elevated and she should receive free stimulation.

While these are not the most favorable cases for treatment, some will recover under good surgical care. If when the abdomen is opened many firm adhesions be found, these should be disturbed as little as possible. No attempt should be made to perform a given operation, and the operator must content himself with inserting drainage in such a manner as to disturb the viscera as little as possible. In cases which have continued for some time, adhesions to the intestine may expose the bowel to laceration if an attempt be made to loosen the adhesions. Should this occur, the rent should be immediately closed with fine catgut, and a Mikulicz drain carried downward among the intestines at the point of rupture. This should be packed with strands of gauze which can be gradually removed. Considerable injury to the intestines may require resection of the wounded portion.

The writer's experience has convinced him of the value of abdominal incision with through-and-through drainage in septic cases. Incision of the posterior vaginal fornix is useful only in strictly circumscribed abscess. The operator obtains but a partial and inaccurate knowledge of the condition of the pelvic and abdominal organs

by this method. With abdominal incision an accurate diagnosis can be made, foci of infection intelligently dealt with, and free drainage secured. Some most unpromising cases will recover with this treatment.

Multiple Abscess Complicating the Puerperal State.—In prolonged puerperal sepsis the patient may become pyemic and abscesses develop in the joints, in the cellular connective tissue, in the pelvis, the peritoneal cavity, and in the kidney. In the writer's experience a woman in prolonged puerperal sepsis had fifteen joint abscesses complicating her recovery, which required a period of more than six months. In these cases the abscesses must be opened and drained as soon as their presence can be recognized. It is better to incise the infected tissue too early than too late. Drainage may be secured by gauze, by strands of gauze covered by rubber, or by the soft-rubber drainage-tube. Irrigation of abscess cavities should be employed with caution, and should be limited to salt solution. Packing and drainage with 10 per cent. iodoform gauze will often cause the abscess cavity to granulate rapidly.

Surgical kidney may require nephrectomy or nephrotomy. Such patients will become exhausted by pain and long-continued infection unless the general vigor be maintained by stimulation with the free use of alcohol. While the patient's recovery may be tedious, it is often surprisingly good when the nature of the infection is considered. The patient may become apparently as well as ever.

Bibliography of the Surgical Treatment of Puerperal Septic Infection

Antoine: Diss., Halle, 1909.
Bardeleben: Archiv f. Gynäkologie, Band 83, Heft 1, 1907.
Bell: Journal of Obstetrics and Gynecology of the British Empire, No. 6, June, 1909.
Boissard: L'Obstétrique, October, 1908.
Bollenhagen: Zentralblatt f. Gynäkologie, p. 151, 1907.
Brenner: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 25, Heft 1, 1907.
Brothers: Medical Record, vol. 71, p. 334, 1907.

Bumm: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 30, Heft 4, 1909; Proceedings German Gynecological Society, vol. 13, p. 105, 1909; Proceedings 16th International Congress, Budapest, p. 140, 1909.

Cannaday: American Journal of Obstetrics, vol. 56, p. 608, 1907.

Corneloupe: Thése de Lyon, 1906.

Cragin: American Journal of Obstetrics, June, 1906.

Cuff: British Medical Journal, March 3, 1906.

Cumston: Transactions of the American Association of Obstetricians and Gynecologists, vol. 18, p. 121, 1906.

Discussion, German Gynecological Association: Zentralblatt f. Gynäkologie, No. 28, 1909.

Flateau: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, p. 500, 1907.

Friedemann: Zentralblatt f. Gynäkologie, No. 23, 1908.

Fromme: Verh. d. deutschen Ges. f. Gyn., Band 12, p. 785, 1907; Münchener med. Wochens., pp. 241 and 1059, 1907; Zentralblatt f. Gynäkologie, No. 11, 1909.

Gardener: Journal of Obstetrics and Gynecology of the British Empire, January, 1907.

Gordon: Journal of Obstetrics and Gynecology of the British Empire, vol. 2, pp. 17 and 468, 1907; British Medical Journal, vol. 1, p. 1479, June 19, 1909.

Guiciardi: Annali di Ostetricia, No. 1, 1906.

Hammerschlag: Proceedings German Gynecological Society, Band 13, p. 377, 1909.

Hartzog: Berliner k. Wochenschrift, No. 20, 1909.

Henkel: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 28, Heft 5, 1908.

Koblanck: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 64, Heft 3, 1909.

Kownatzky: Atlas, Wiesbaden, Bergmann, 1907; Zeitschrift f. Geburtshülfe und Gynäkologie, Band 59, p. 374, 1907.

Kritzler: Zentralblatt f. Gynäkologie, No. 28, 1909.

Krömer: Deutsche med. Wochens., p. 365, 1907; Proceedings German Gynecological Society, vol. 13, p. 223, 1909.

Krönig: Proceedings German Gynecological Society, vol. 13, p. 336, 1909.

Latzko: Wiener klin. Wochens., No. 19, 1907; Wiener m. Wochenschrift, Nos. 27, 34, 35, 1909.

Leopold: Zentralblatt f. Gynäkologie, p. 193, 1908; Archiv f. Gynäkologie, Band 89, Heft 1, 1909; Proceedings German Gynecologicol Society, vol. 13, p. 292, 1909.

Macan: Journal of Obstetrics and Gynecology of the British Empire, October, 1908.
MacLaren: Surgery, Gynecology, and Obstetrics, June, 1908.
Martin: Deutsche m. Wochenschrift, No. 6, 1909.
McKay: American Journal of Obstetrics, October, 1907.
Menge: Proceedings German Gynecological Society, vol. 13, p. 332, 1909.
Opitz: Proceedings German Gynecological Society, vol. 13, p. 325, 1909.
Prochownick: Zentralblatt f. Gynäkologie, p. 104, 1908.
Runge: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 29, Heft 5, 1909.
Sachs: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 64, Heft 2, 1909.
Schmidlechmer: Zentralblatt f. Gynäkologie, No. 40, 1909.
Seitz: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 493, 1907.
Sellheim: Berliner Klinik, p. 231, 1907.
Sinclair: Surgery, Gynecology, and Obstetrics, November, 1907.
Stuart: American Journal of Obstetrics, August, 1906.
Vineberg: American Journal of Obstetrics, March, 1909.
von Rosthorn: Proceedings German Gynecological Society, vol. 13, p. 384, 1909.
Watkins: American Journal of Obstetrics, vol. 60, p. 503, September, 1909.
Williams: American Journal of Obstetrics, May, 1909.
Winter: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 21, Heft 1, 1905.
Wormser: Proceedings German Gynecological Society, vol. 13, p. 242, 1909.

PUERPERAL MASTITIS

This infection is recognized as developing from one of two causes. It has been shown by several observers, the writer among them, that the milk within the breast may contain bacteria before the child has attempted to nurse and without a discoverable lesion upon the nipple or breast. The mother may be without symptoms in these cases, but the effort to nurse often results in slight abrasions or wounds of the nipple, through which bacteria from the milk gain access to the subcutaneous and cellular tissues. Localized infection, becoming an abscess, may speedily develop. The child also

may suffer from intestinal infection after taking milk from such a mother. Breast abscess may result, depending in its extent and duration upon the local conditions in the breast.

In the more usual varieties of breast abscess the wound or abrasion upon the nipple may be recognized as the point of entry of the infection. This will usually travel along the milk-ducts until a sinus has become infected. As the breast becomes turgid with increased secretion the conditions become more and more favorable for the formation of pus.

Abscess frequently occurs in the subcutaneous and areolar tissues around the nipple, the infection spreading thence into the deeper portions. In extreme cases the breast may become honey-combed, and in neglected cases abscesses may burst near the nipple over various portions of the breast or in the axilla.

In treating puerperal mastitis the effort to prevent the formation of pus may further its development. While simple engorgement of the breast will yield safely to fomentation, massage, and pumping, should infection be present, these measures serve efficiently to increase its vigor and the extent of its development. It is a safe clinical rule to avoid fomentation, massage, and pumping if these measures properly applied increase the patient's suffering and cause a rise in temperature.

In the presence of beginning localized infection in the areola about the nipple an incision should be made as soon as possible. The prompt emptying of a small abscess in this location may prevent general infection of the breast and bring the attack of mastitis to a speedy termination. Even if pus has not formed, no harm can come, under antiseptic precautions, from incising the hardened and inflamed area near the nipple. If no focus of infection can be detected, but the milk contains abundant bacteria, and if the whole breast be slightly sensitive and enlarged, infection of the milk-ducts is undoubtedly present. If abscess has not developed the milk-ducts may be at least partially drained, followed by the patient use of the breast-pump. The milk should not be taken by the child, but should

be immediately destroyed. If the patient has had several rises of temperature above 101° F., if the pulse remains persistently although but moderately elevated, and if there has been for several days tenderness over one or more areas of the breast, abscess must be suspected. While in pronounced cases fluctuation may be detected, in many cases it cannot be recognized. If the operator waits for distinct fluctuation he may delay until the breast is the site of several abscesses.

The patient's convalescence will be more rapid and complete if incision be practised without waiting for pronounced, widespread fluctuation. Under anesthesia incisions should be made parallel with the course of the milk-ducts, first through the areola surrounding the nipple sufficiently to enable the operator to introduce his gloved finger. Pressure should then be made in various directions, and if infection be present with abscess the infected tissue will yield and the abscess be discovered. Should this not occur, other incisions should be made over portions of the breast which have been especially sensitive, or where redness has developed, or where increased resistance or bogginess can be detected by touch. The finger again should explore such areas, when an abscess will usually be discovered.

In draining an infected breast the writer has found great advantage in through-and-through drainage with two tubes passing through the breast and crossing near the nipple. Incisions may be made near the borders of the breast in the two upper and two lower quadrants. With the fingers an effort should be made to find areas of softened and infected tissue, to break down such areas, and to establish tracts for drainage extending completely through the breast. A long curved forceps may then be inserted through the original incision near the nipple, carried through the tissue of the breast, and made to emerge at the upper and then at the lower openings. Medium-sized perforated rubber drainage-tubes should then be drawn completely through the breast from above downward. These two tubes cross in the central opening near the nipple. They are then washed thoroughly by an injection of saline solution with a piston

syringe, the incision near the nipple drained with a strand of gauze, and the breast covered with a copious antiseptic dressing. Once or twice daily the tube should be irrigated or syringed out with salt solution, with the gauze packing near the nipple renewed. As the infection subsides the tubes should be drawn downward from above and gradually cut off until they are completely removed. The lower opening should be kept patent by packing with strands of iodoform gauze. As soon as possible after operation the patient should assume the recumbent or sitting posture to facilitate drainage.

During the course of puerperal mastitis, although the initial abscess may have been opened and drained, others in various portions of the breast may develop. These must be separately incised unless the through-and-through drainage described by the writer has been employed. In the latter event the small abscesses will usually burrow through into the drainage tracts and thus discharge their contents.

A complete diagnosis of the condition present may be obtained by a bacteriologic examination of the pus discharged from the infected breast. Should tuberculous infection be demonstrated, as soon as the patient's condition permits the breast should be completely removed. If the infection found be streptococci and staphylococci, free drainage will suffice.

Mastitis in the Newborn.—The newborn infant may develop mastitis without perceptible symptoms and without a perceptible lesion through which infection may have entered. In these cases the infection may have come through the blood-stream or through some slight lesion in the skin about the nipple which has not been perceived. Redness, swelling, and hardness of the breasts develop, followed by the gradual formation of pus Incision should be practised as soon as the presence of pus is suspected, and the abscess-cavity irrigated with salt solution and packed with sterile gauze. Daily irrigation with salt solution should be used until the cavity closes. But very little reaction occurs in these cases, the infants are little, if at all, disturbed and usually nurse without interruption.

In prolonged cases of puerperal mastitis, where suppuration has

seriously depleted the patient's general strength, removal of the infected breast may be indicated. The operation is performed by the ovoidal incision, and the breast and its surrounding fat removed down to the subjacent fascia. The wound should be drained for several days after the removal of the breast.

Where supernumerary collections of mammary tissue are present which do not communicate with the normal glands, infection or abscess may be threatened through retention of milk. In a case in the experience of the writer the patient, a multipara, was, after each confinement, greatly annoyed by the swelling of supernumerary breast tissue situated near the border of the axilla. Fortunately, this communicated with the mammary gland, and pressure, with the application of a bandage, and gentle massage sufficed to empty this tissue sufficiently to prevent engorgement and formation of abscess.

Bibliography of Puerperal Mastitis

Bauer: Zentralblatt f. Gynäkologie, No. 23, 1906; Monatsschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 265, 1907.
Blane: Prov. méd., p. 594, 1907.
Colorni: Annali di Ostetricia, No. 7, 1908.
Döderlein: Zentralblatt f. Gynäkologie, No. 49, 1906.
Durand: Lyon méd., p. 661, 1907.
Hartmann: Münchener med. Wochens., No. 6, p. 261, 1907.
Heil: Gyn. Rundschau, Band 1, p. 203, 1907.
Heinsium and Lissauer: Deutsche med. Wochens., p. 2132, 1907.
Lizwinowicz: Zentralblatt f. Gynäkologie, p. 369, 1907.
Paul: Zentralblatt f. Gynäkologie, No. 24, 1907.
Planchu: Journ. d'Obst. de gyn. et de Péd., July 20, 1907.
Rouzaud: Journ. de méd. de Paris, p. 391, 1907.
Sauer: Diss., Erlangen, 1907.
Singley: Annals of Surgery, p. 672, 1907.
Stiassny: Gyn. Rundschau, Band 1, p. 5, 1907.
Trillat and Latarjet: Lyon méd., p. 605, 1907.
Zacharias: Münchener med. Wochens., p. 716, 1907.

PART IV

THE SURGERY OF THE NEWBORN

ASPHYXIA

In dealing with asphyxia in the newborn the ordinary methods of resuscitation practised by obstetricians are usually successful. Where there is some obstruction to the entrance of air in the trachea the obstetrician may be called upon to catheterize the trachea and, rarely, to perform tracheotomy. The insertion of the tracheal catheter can usually be effected without difficulty, the operator taking the precaution to secure a good light in the child's mouth and to place the child's head and neck in a favorable position. The head should be thrown backward, the tongue drawn forward, and care should be taken not to pass the catheter into the esophagus. Aspiration of mucus and blood from the trachea may be performed by attaching a piece of rubber tubing to the catheter and cautiously removing the retained material by a strong piston syringe. If it is desired to introduce air through the catheter, this may be done by a rubber bulb or by direct insufflation from the mouth of the operator.

In practising tracheotomy upon the newborn the operator should avoid the enlarged thymus gland, which will bleed freely. The small size of the trachea may make the operation difficult, but the operator should take sufficient time to thoroughly expose the trachea before attempting to open it. A medium-sized rubber catheter will often be found to serve better than the silver tracheotomy tube.

Bibliography

Ahlfeld: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 56, Heft 3, 1905.

Beneke: Münchener med Wochens., p. 1754, 1907.

Beumer: Ärztl. Sachverständigenztg., Band 13, p. 407, 1907.

Biasotti: Arch. Ital. di Ginecologia, Band 10, Part 2, p. 113, 1907.
Blumm: Zentralblatt f. Gynäkologie, No. 31, 1907.
Gaszynski: Zentralblatt f. Gynäkologie, No. 29, 1905.
Kathe: Berliner klin. Wochens., Band 44, p. 1099, 1907.
Malim: British Medical Journal, p. 1363, 1907.
Marx: American Journal of Obstetrics, p. 555, 1907.
Modica: Arch. di Farmacol sperin, Band 5, Hefts 1 and 2, 1907.
Offergeld: Zentralblatt f. Gynäkologie, No. 52, 1906.
Rabé: Gaz. des Hôp., No. 143, 1906.
Richter: Zentralblatt f. Gynäkologie, No. 31, 1907.
Schmidt: Inaug.-Diss., Freiburg, 1905.
Schultze: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 57, Heft 1, 1905.
Seitz: Zentralblatt f. Gynäkologie, No. 31, 1907.
Teuffel: Zentralblatt f. Gynäkologie, No. 31, 1907.
Washbourn: British Medical Journal, p. 1776, 1907.
Weir: Glasgow Medical Journal, July, 1907.
Wicke: Inaug.-Diss., München, 1906.

UMBILICAL HEMORRHAGE

Hemorrhage may occur from the umbilicus of the newborn, from wounds in the umbilical vessels, or from a disordered state of the infant's blood. In the former, bleeding is controlled by passing two pins or large needles at right angles beneath the vessels, and then adjusting a figure-of-eight ligature about the needles. The operator may prefer to expose the vessels and ligate them individually. To avoid infection it is well to ligate the vessels in addition, as near the tip as possible, with very fine catgut or silk. Pressure should be made over the umbilicus with a firm pad of gauze.

If umbilical hemorrhage results from the infected condition of the blood, surgical methods to check the hemorrhage will be useless, for this disorganized blood will ooze through the vessels, and umbilical hemorrhage is accompanied in these cases by hemorrhage into the intestines, into the bronchial tubes, the parenchyma of the lungs, and other viscera. Subcutaneous hemorrhage occurs in petechial spots and but few of these patients recover. Such cases are the result of infection usually developing in the intestines, and in the

experience of the writer the most efficient treatment consists in thorough irrigation of the large intestine with normal salt solution.

Bibliography

Chirié: Bull. de la Soc. d'Obstétr. de Paris, No. 10, p. 278, 1907.
Durante: Bull. de la Soc. d'Obstét. de Paris, No. 10, p. 303, 1907.
Evicke: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 63, Heft 3, 1909.
Frank: Monatsschrift f. Geburtshülfe und Gynäkologie, Band 22, Heft 4, 1905.
Greiffenberg: Inaug.-Diss., Halle, 1906.
Hass: Inaug.-Diss., Heidelberg, 1906.
Holzapfel: Münchener med. Wochens., No. 54, p. 1751, 1907.
Jens: Ugeskr. f. Laeger., No. 68, p. 673, 1907.
Keller: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 58, Heft 3, 1906.
Knöpfelmacher: Zentralblatt f. inn. Med., Band 28, p. 314, 1907; Wiener med. Presse, No. 48, p. 693, 1907.
Lovrich: Zentralblatt f. Gynäkologie, No. 31. 1907.
Rousseau: Thése de Lyon, 1906.
Salge: Deutsche med. Wochens., No. 33, p. 663, 1907.
Shukowski: St. Petersburg med. Wochens., No. 32, 1907.
Stern: Inaug.-Diss., Freiburg, 1907.
Stumpf: Inaug.-Diss., München, 1907.
Torday: Pester med.-Chir. Presse, No. 43, p. 685, 1907.
Werkmesiter: Inaug.-Diss., Greifswald, 1906.

UMBILICAL HERNIA

While ordinary slight protrusion of the stump of the umbilical cord requires only the patient application of a pad and bandage, in some cases there is congenital lack of tissue, and operative treatment is indicated. If possible this should be done without anesthesia, as newborn infants bear anesthesia badly. The sac should be dissected out and its edges brought accurately together by continuous fine catgut sutures. Some operators prefer to use fine silk for this purpose. The fascia and skin are closed accurately and a gauze dressing applied with a snugly fitting abdominal bandage. Operation in these cases is usually successful.

THE SURGICAL TREATMENT OF FRACTURES IN THE NEWBORN

After a difficult labor with severe birth pressure the child may be born with a fracture of the cranial vault. Should this be depressed, operation is indicated and will often prove successful. The scalp should be incised over the point of fracture and the bony fragments cautiously brought into their normal position as nearly as possible. If the dura mater be found to be injured the retained blood-clot should be gently removed and the edges of the dura mater brought together with fine catgut. If oozing be present a very small strand of gauze

Fig. 248.

Fig. 249.

Figs. 248 and 249.—Indentation of skull removed by operation (Kerr).

may be left in the lower angle of the wound as a drain, or a few strands of silkworm gut may be laid at the bottom of the wound.

Unfortunately, cases of difficult birth with cranial fracture often result in rupture of cranial vessels, producing hemorrhage into the substance of the brain. If such be considerable, the raising of depressed portions of bone will not be followed by much improvement, and the child will perish as a result of the intracranial bleeding.

Fractures of the Upper Extremities.—Fractures of the clavicle

are not uncommon during labor in children whose shoulders are much above the average and with whom delivery is artificially accomplished. Such fractures are commonly greenstick in variety, complete fracture being exceedingly rare. There is distinct mobility with displacement of fragments at the site of injury, and the contour of the shoulder is altered.

To keep such fragments in apposition the child may be placed on

Fig. 250.—Skiagram of infant born after difficult delivery, showing absence of fracture and dislocation.

its back upon a firm pillow. If it can be maintained in this position the fragments will come into apposition without difficulty. As this may be difficult, the child may be bandaged upon the pillow by a broad figure-of-eight flannel bandage passed over the site of fracture and also encircling the opposite shoulder.

In a case of double fracture of the clavicle occurring in the practice of Dr. George A. Ulrich, Demonstrator of Obstetrics in the Jeffer-

Fig. 251.—Fracture of arm following difficult delivery by version.

son Medical College, the fracture was treated by placing the infant on a padded narrow board, 24 inches long and 7 inches wide. Across this was placed a narrow piece, one-quarter of the distance from the

Fig. 252.—Greenstick fracture following difficult delivery; breech extraction.

top, and firmly fastened. The child's arms were carried upward, absorbent cotton placed between the arms and the sides of the body to avoid bringing the skin surfaces together, and the arms were bandaged to the sides. A firm pad was inserted between the shoulders and

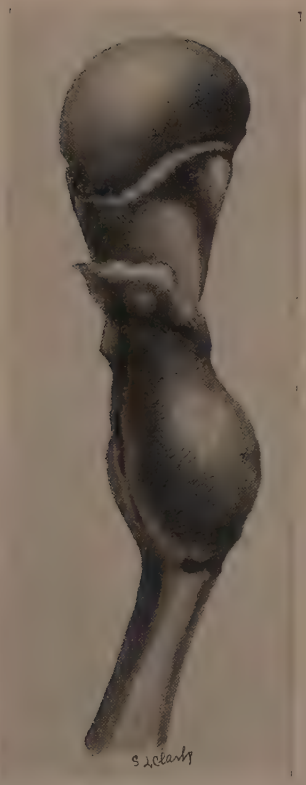

Fig. 253.—Callus formed in fracture of the humerus.

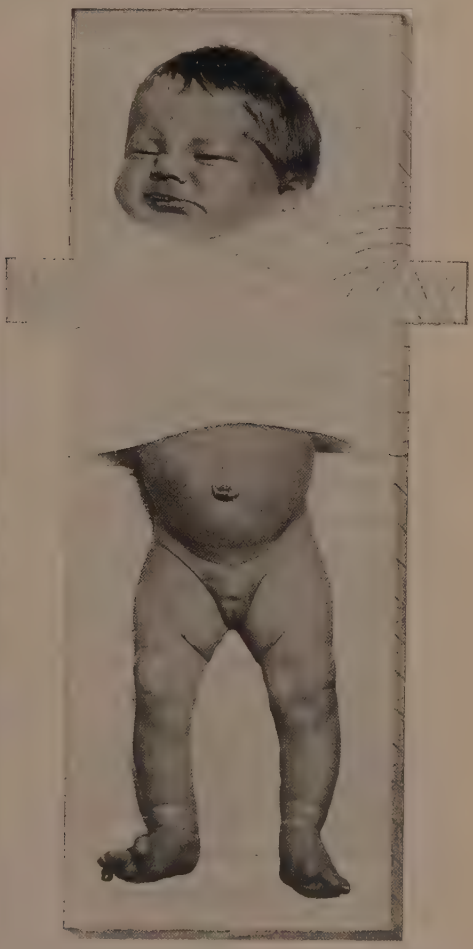

Fig. 254.—Fracture of both clavicles in difficult birth. Mode of dressing.

over each clavicle This apparatus remained upon the child for eighteen days, and upon its removal perfect union had resulted.

Fractures of the humerus may occur during difficult version and extraction, in bringing down the arms. Fracture of the humerus

may also develop in spontaneous birth with vertex presentation if the arm prolapses beside the head. In treating these cases a splint of soft pasteboard or spongiopiline covered with cotton and gauze may be fitted over the fracture and kept in place by gauze bandages. The splints should be frequently removed, as callus speedily forms, and care should be taken not to exercise undue pressure upon the tissues. As soon as callus forms the splint should be discarded and the child allowed to move the arm freely.

Fig. 255.—Complete fracture of the humerus in difficult extraction, with craniotomy.

Fractures of the femur, though rare, may occur in difficult version and extraction. A good result is usually obtained by the use of splints only, without extension; but should evident shortening develop, the child may be bandaged upon a pillow and extension applied.

In the writer's experience serious deformity has not followed this accident.

Bibliography

Brewitt: Zentralblatt f. Gynäkologie, No. 13, 1908.
Couvelaire: Annales de Gyn., Second Series, No. 4, 1907.
Favre: Inaug.-Diss., Königsburg, 1906.
Groeschel: Inaug.-Diss., Breslau, 1907.
Grossgebauer: Inaug.-Diss., Bonn, 1906.
Hofbauer: Zentralblatt f. Gynäkologie, No. 31, 1907.

Israelowitz: Inaug.-Diss., Basle, 1906.
Jolly: Zentralblatt f. Gynäkologie, No. 31, 1907.
Jones: British Medical Journal, June 6, 1908.
Katzmann: Inaug.-Diss., Freiburg, 1907.
Lotheissen: Wiener med. Wochens., No. 57, p. 2274, 1907.
Pottier: Thése de Paris, No. 44, Band 7, 1906.
Riemann: Zentralblatt f. Gynäkologie, No. 31, 1907.
Scheib: Verhandl. d. Deutschen Gesellsch. f. Gyn., 12. Kongress, p. 295, 1907.
Schiff: Zentralblatt f. Gynäkologie, No. 49, 1905.
Seitz: Archiv f. Gynäkologie, Band 82, p. 529, 1907; Archiv f. Gynäkologie, Band 83, p. 701, 1907; Zentralblatt f. Gynäkologie, No. 31, 1907; Verh. d. deutsch. Ges. f. Gyn., 12, Kongr., p. 416, 1907.
Stuhl: Deutsche med. Wochens., No. 33, p. 103, 1907.
Veit: Zentralblatt f. Gynäkologie, No. 31, 1907.

THE SURGICAL TREATMENT OF BRACHIAL PALSY IN THE NEWBORN

Injuries to the brachial plexus may result from violent and rapid delivery of the child, the head presenting after the birth of the arm,

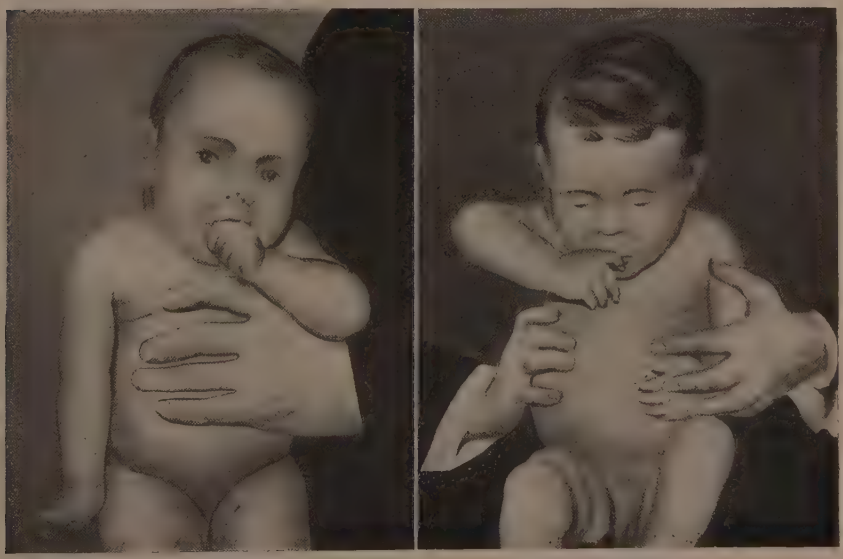

Fig. 256. Fig. 257.

Figs. 256 and 257.—Paralysis of upper extremity after difficult birth, cured by operation.

or when difficulty is experienced in bringing down the shoulders. In cases of breech labor with extraction, if the arms become extended above the head and must be forcibly brought down, injury may also occur. The condition is recognized by loss of motion on the affected side, with gradual atrophy and alterations in the temperature. If the

Fig. 258.—Skiagram of infant's body. Difficult delivery. Paresis of left upper extremity, showing the absence of fracture.

brachial plexus be exposed, the loops of the fourth, fifth, and sixth cervical nerves are found most commonly affected. Occasionally the sternocleidomastoid muscle is also injured. In some cases of fracture of the clavicle and fracture of the humerus a resulting callus has produced injury to the brachial plexus. Separation of the epiph-

ysis may also be present. Stalper[1] found that actual laceration of the nerve-fibers is exceedingly rare. The connective tissue surrounding the nerves is often lacerated and callus of connective tissue

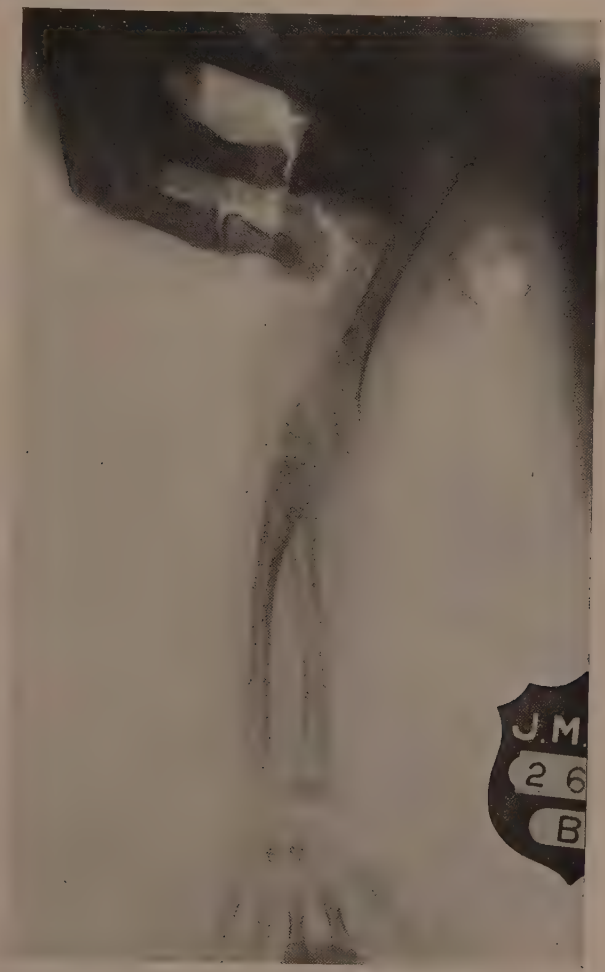

Fig. 259.—Skiagram of infant's body. Difficult delivery. Paresis of left upper extremity, showing the absence of fracture.

forms which compresses and injures the nerve-trunks. Where spontaneous labor is unduly prolonged, cerebral compression may result in injury to the motor centers supplying the upper limbs.

[1] Monatsschrift f. Geburtshülfe und Gynäkologie, Band 14, p. 14, 1901.

In many cases injuries to the brachial plexus do well when treated by splints, by massage, and the galvanic current. The injured extrem-

Fig. 260.—Skiagram of infant's body. Difficult delivery. Paresis of left upper extremity, showing the absence of fracture.

ity must be kept warm. If tendency to contraction develops, a splint should be fitted. Kennedy,[1] Clark, Taylor, and Prout[2] have secured

[1] British Medical Journal, vol. 1, p. 298, 1903, and No. 2286, p. 1065, 1904.
[2] American Journal of the Medical Sciences, p. 670, October, 1905.

good results when contraction developed by cutting down upon the brachial plexus, isolating injured nerves, freeing them from surrounding adhesions, excising the thickened trunks, and suturing the severed ends with fine catgut. This operation is best performed when the child is several months old.

Bibliography

Bullard: American Journal of the Medical Sciences, No. 134, p. 93, 1907.
Engelhard: Inaug.-Diss., Utrecht, 1907.
Jeannin: Zentralblatt f. Gynäkologie, No. 32, 1907.
Kilvington: Zentralblatt f. Chir., No. 34, 1907.
Magne: Thése de Paris, No. 42, 1906 and 1907.
Prout: Journal of the American Medical Association, No. 48, p. 103, 1907.
Seitz: Münchener med. Wochens., No. 54, 1907.
Steffen: Zentralblatt f. Gynäkologie, No. 31, 1907.
Taylor: Journal of the American Medical Association, January 12, 1907, and No. 48, p. 96, 1907.
Thibonneau: Thése de Paris, No. 7, 1906 and 1907.
Warrington and Jones: Lancet, December 15, 1906

INJURIES TO THE SCALP

Injuries to the fetal scalp received during labor are usually contused wounds which rarely require suture. Should hemorrhage occur from vessels which can be isolated, they may be tied, or if the vessels cannot be secured, a curved needle armed with fine catgut should be passed deeply beneath the bleeding area, and hemorrhage thus controlled by pressure. Antiseptic solutions, with the exception of boric acid, should not be applied to wounds upon the newborn child because of the danger of absorption and poisoning. Contused wounds may be powdered with boric acid or with a sterile substance, such as baked starch, and the powder allowed to form a protective crust or covering. Where surgical dressings are necessary, sterile gauze may be retained in position by a skullcap or by zinc oxid adhesive plaster.

Cephalhematoma.—This common injury to the scalp and cranium is often accompanied by bruising or laceration of the sternocleido-

Fig. 261.—Cephalhematoma.

mastoid muscle. In both cases the lesion is essentially an extravasation of blood with rupture of capillaries, injury to connective tissue,

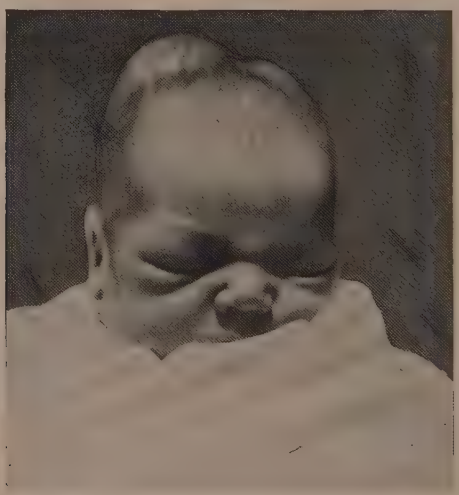

Fig. 262.—Cephalhematoma.

and in the cranial injury bruising of the periosteum, and sometimes separation over a considerable area.

This injury develops in cases where the resistance of the mother's tissues has caused unusual pressure, or where premature rupture of

Fig. 263.—Compression of the fetal head in the biparietal diameter in a patient who had strong labor-pains before delivery by section.

the membranes or the use of forceps have complicated labor. By some an abnormal growth of hair upon the child's head has been

considered a predisposing cause. The injury has also been observed after spontaneous labor without complications, in which its cause could not be detected.

When blood accumulates beneath the periosteum upon the internal surface of the cranial bones it forms internal hematoma. This can be diagnosticated only by pressure symptoms, which gradually develop.

In cases where the head is strongly twisted to one side and a considerable pressure is exerted upon the neck, hematoma of the sternocleidomastoid muscle may develop. The tumor is found in the belly of the muscle and may become distinctly hard and painful upon pressure. The muscle itself is sometimes torn and its sheath infiltrated.

Torticollis may be congenital, developing within the uterus from pressure, usually the result of some complicated position or presentation. This causes pressure upon the blood-vessels, resulting in atrophy with interstitial myositis.

Treatment.—In treating hematoma of the cranium or sternocleidomastoid muscle the operator must await the formation of a definite tumor and its limitations by inflammation. Usually these cases do not require incision and drainage. The skin should be carefully cleansed and a protective dressing of sterile gauze should be worn. Should the clot become softened and absorption be unduly prolonged, it may be incised, the clot removed, and the torn vessels isolated and tied. The cavity of the clot should be firmly packed with sterile gauze. This packing should be renewed with irrigation with salt solution until the cavity is obliterated.

In dealing with congenital torticollis, as soon as the child's general vigor has become established such operation as is indicated in this condition may be performed.

LESIONS OF THE FACE AND THE ORGANS OF SPECIAL SENSE

In addition to contused wounds upon the face, the newborn child may present malformations which should receive attention even in

the first weeks of life. Hare-lip and cleft palate, if extensive, cannot be operated upon at once, but something can be done to bring together the gaping parts by daily pressure. The physician, or the nurse in his absence, should apply the fingers firmly against the maxillary bones and make firm pressure directly toward the central line of the cranium several times daily. In the experience of the writer a perceptible gain has followed this simple procedure.

Hare-lip may be operated upon as soon as the child is vigorous enough to bear moderate blood loss. Deep anesthesia should be

Fig. 264.—Head of child bruised by ineffectual attempts at forceps delivery. Mother delivered by Porro operation. The child survived, with loss of sight in the bruised eye.

avoided, and the operation, if possible, performed without anesthesia. The more extensive operation upon the palate must be deferred until the child is older.

Injuries to the Ear.—In unskilful delivery by forceps or in violent and forcible extraction the ear of the child may be wholly or partially severed. The internal ear will be injured if the pressure has been severe, the cranial bones will be fractured, and the scalp considerably lacerated. If such injuries are extensive a fatal result will soon follow. Where the child's condition justifies it, lacerations should

be promptly repaired with fine sterile catgut. Mastoid injury, should infection follow, must be treated by early drainage.

Injuries to the Eye.—Long-continued pressure frequently causes hemorrhage into the retina and extravasation of blood into the chambers of the eye. In some cases these injuries are accompanied by fractures of the cranial bones. Unsuccessful attempts at forceps delivery may rupture some of the coats of the eye, ruining its refractive media. That such injuries are not infrequent is shown by Paul.[1] In 200 newborn infants there was retinal hemorrhage in 50 per cent. of those born through contracted pelves. In spontaneous birth the same lesion was observed in 40 per cent. Where labor was complicated and severe, without pelvic contraction, hemorrhage into the retina occurred spontaneously, and there was retinal bleeding of variable extent in one-fifth of the cases. Should the child be born with a dislocated eye, forced from its socket by severe pressure, the eyeball should be immediately replaced and the eye bandaged with gauze saturated with boric acid solution or sterile salt solution. An ophthalmologist should be summoned to such cases as soon as possible.

Bibliography of Injuries to the Head and Face in the Newborn

Brav: New York Medical Journal, No. 86, p. 499, 1907.
Bugge: Zentralblatt f. Gynäkologie, No. 32, 1907.
Döring: Zentralblatt f. Chirurgie, No. 34, 1907.
Ginzburg: Inaug.-Diss., Berlin, 1907.
Heinlein: Münchener med. Wochens., No. 54, p. 2619, 1907.
Peters: Archiv f. Augenhlkde., Band 56, Heft 4, 1907.
von Sicherer: Deutsche med. Wochens., No. 33, p. 1564, 1907.

CONGENITAL LACK OF DEVELOPMENT

In the diagnosis of fractures, dislocations, and other injuries to the bones of the newborn care must be taken not to mistake malformations and lack of development for recent injuries. Sperling[2] found by examining fetal bones with the *x*-ray and microscope that

[1] Inaugural Dissertation, Halle, 1900.

[2] Zeitschrift f. Geburtshülfe und Gynäkologie, Band 26, p. 1134, 1902.

many cases of supposed fracture were congenital lack of development. The most frequent cause of these conditions was adhesions in the amnion occurring during the first and second months in the development of the embryo. Periostitis with infiltration by small cells is the lesion usually present, without bending of the bones or callus. In 60 per cent. of cases which had been diagnosticated as fractures occurring in the uterus, congenital malformation was found to be the lesion present. The most striking example of this is seen in congenital deformity and dislocation of the hip-joint.

Such cases are rarely suitable for surgical treatment until the child has passed several years of life. The surgeon may then choose between Lorenz's method in cases of dislocation of the hip-joint or the open method by incision practised extensively by Hoffa.

Bibliography

Forbes and Russell: Montreal Medical Journal, December, 1906.
Gilbert: Gaz. des Hop., No. 80, p. 1578, 1907.
Hamburger: Deutsche med. Wochens., No. 33, 1907.
Kraemer: Wiener klin. Wochens., No. 20, 1907.
Lett: The Lancet, vol. 1, p. 1365, 1907.
Martin: Surgery, Gynecology, and Obstetrics, September, 1908.
Maxwell: Transactions Obstetrical Society of London, No. 48, p. 277, 1907.
Schmidt: Inaug.-Diss., Freiburg, 1905.
Schüller: Deutsche med. Wochens., No. 33, 1907.
Stratz: Zeitschrift f. Geburtshülfe und Gynäkologie, Band 65, Heft 1, 1909.

THE SURGICAL TREATMENT OF INFECTION IN THE NEWBORN

The umbilicus is the point of entrance of infection in the majority of cases in newborn children. This is frequently accompanied by wounds or abnormalities in the umbilical vessels, and is usually preceded by umbilical hernia. The umbilicus does not normally close and there remains an open granulating surface through which infection readily enters. In some cases an umbilical fungous growth develops which bleeds on contact.

In treating these conditions, umbilical hemorrhage must be pre-

vented as far as possible and promptly controlled. Fungous growths of the umbilicus may be ligated or destroyed by the actual cautery. Should infection be present, but little can be done surgically to limit its extent. The umbilical surface may be cleansed thoroughly with salt solution and sterile dressings applied. Should persistent oozing of dark fluid blood occur, it is a symptom that the blood has become extensively infected and a fatal termination usually follows.

Bibliography

Allan: Zentralblatt f. Gynäkologie, No. 31, 1907.
Aps: Inaug.-Diss., Tübingen, 1907.
Champétier de Ribes: Zentralblatt f. Gynäkologie, No. 31, 1907.
Chiari: Deutsche med. Wochens., No. 33, 1907.
Komak: Bulletin of the Lying-in Hospital, New York, March, 1908.
Schubert: Zentralblatt f. Gynäkologie, No. 7, 1907.
Stumpf: Inaug.-Diss., München, 1907.

CIRCUMCISION

The traditional eight days for the performance of this operation may be selected by the obstetrician if the religious views of the parents of the child suggest its election. If not, any convenient time during the first month or six weeks may be chosen. In newborn children anesthesia is contraindicated, as the operation can be done more safely without it, and the child suffers but little disturbance and inconvenience. In cases which seem to promise the avoidance of the operation the prepuce should be thoroughly dilated and retracted and adhesions separated by a blunt-pointed probe. Sterile olive oil should be freely applied to prevent the adhesions from re-forming. If the child be under the care of an intelligent nurse this simple procedure will often be sufficient.

In cases where there is great contraction or where dilation is followed by but temporary relief, circumcision gives the only promise of success.

In performing the operation the obstetrician must be careful to secure sufficient assistance to completely control the child. The

infant should be placed upon a small table suitably padded and in a good light. One assistant is required to control the arms alone in active, vigorous children where the operation is done some weeks after birth. In smaller children an experienced nurse can control the lower extremities and practically the upper as well. A clean handkerchief dipped in cool water may be introduced into the mouth so that the child can suck upon it during the operation.

The parts should be thoroughly cleansed with clean soap and sterile water and with boric acid solution. It is well to take a time when the infant has not been fed, thus preventing vomiting after the operation, and keeping the bottle as a sedative in quieting the child. A reliable surgical assistant is necessary in addition to one or two nurses.

The tip of the prepuce is seized by hemostatic forceps and drawn gently outward, and a guard, composed of the handles of a pair of small scissors or any other suitable appliance, is placed in front of the penis, compressing the prepuce. The incision should be slightly oblique from above, downward and outward. The redundant skin should be severed with blunt-pointed sharp scissors. A knife should not be used, as a sudden motion of the child's limbs escaping the grasp of the nurse might result in an incised wound of considerable severity. The severed tissues should be allowed to retract, and oozing temporarily checked by the application of sterile sponges. The inner layer should then be thoroughly separated by a blunt-pointed probe or director, and incised sufficiently in the median line above to permit its free retraction. Retained secretions should be sponged away with sterile water. Sufficient of the inner layer should then be trimmed away to permit approximation with the skin edges, a sufficient flap, if possible, being left to cover the corona.

In the writer's experience this is desirable, and results in less irritation than if the tissues are trimmed to such an extent that the corona is left exposed. Care should be taken not to cut upon the dorsal aspect too far, lest the dorsal artery or vein be wounded. The obstetrician must also take care that the tissues are sufficiently incised to

permit free retraction without the formation of a constricting band when the tissues heal.

In the writer's experience good results have followed the ligation of the frenulum by a stitch passed from above downward by two needles threaded with the same fine catgut suture. These two needles are inserted one on each side of the median line, joining the mucous and cutaneous surfaces, and the ends are tied below upon the skin surfaces. This sufficiently secures the vessels and prevents hemorrhage. Several additional stitches of fine sterile catgut are taken upon the upper surfaces, bringing the mucous and cutaneous edges in apposition. The operator must see to it that the dorsal vessels do not bleed and are properly secured. When oozing has ceased, a probe dipped in sterile olive oil should be applied to the coronal region, thus preventing the re-formation of adhesions.

If fine sterile catgut has been used it is not necessary to remove the stitches, as they will be absorbed during the first week. A narrow strip of iodoform gauze should be applied about the junction of the severed edges and allowed to remain in place from twenty-four to thirty-six hours. This prevents oozing and infection. The parts should be covered with sterile gauze upon which is placed an ointment of 10 per cent. boric acid, and the dressing retained in position by a T-bandage. When urination occurs the gauze should be renewed, and, if necessary, the parts cleansed with boric acid solution or sterile water. Thirty-six hours after the operation the child may be placed in a large basin with warm sterile water and the iodoform gauze gently soaked off. This warm bath may be repeated daily to advantage. During convalescence the parts should be protected by sterile gauze and the boric ointment applied liberally to prevent re-formation of adhesions and irritation from the dressings. Convalescence is usually complete in a week or ten days.

The complications attending circumcision in infants are hemorrhage, the re-formation of adhesions, and the growth of scar tissue, defeating the purpose of the operation. Hemorrhage should be efficiently prevented by a ligature, if necessary, but stitches rarely fail

to prevent or control bleeding. If bleeding points must be tied, fine catgut should be selected. Should oozing be excessive, the nurse should be instructed to make pressure with a pad of gauze and a T-bandage. Infection is prevented by aseptic precautions, which should be strictly carried out. In thirty-six to forty-eight hours the edges of the wound are sufficiently united to prevent infection under favorable conditions. Occasionally in children who are not under good control injuries may occur by bruising followed by considerable swelling. In other cases marked swelling develops, with infiltration of the tissues by serum, which subsides without injury under aseptic care. In the hands of an experienced operator, under aseptic precautions, the operation gives good results, and should be promptly performed unless dilation proves thoroughly efficient.

If the child be excessively restless and fretful a small dose of paregoric, 3 to 5 drops, may be given, with 10 drops of brandy. Usually within an hour after the operation the child will take one-half or two-thirds its usual nourishment eagerly and will drop asleep. If it be excessively restless, bromid of sodium, in 1 or 2 gr. doses, may be given as necessary. In cases where urination has been prolonged and difficult the child often experiences marked relief after the operation, and within a few days is noticeably more comfortable and quiet.

Bibliography

Bland-Sutton: British Medical Journal, No. 1, p. 1409, 1907.
Churchward: British Medical Journal, No. 2, p. 51, 1907.
Dampier-Bennett: British Medical Journal, No. 2, p. 243, 1907.
Deutsch: Orvosi Hetilap., No. 45, 1906.
Eder: British Medical Journal, No. 2, p. 117, 1907.
Gallant: International Clinic, Philadelphia, 1907.

INDEX

Abdomen, closure of, after celiohysterotomy, 307, 309
during pregnancy, 23
Abdominal aorta, compression, in postpartum hemorrhage, 380
dressing after celiohysterotomy, 308, 309
in celiohysterectomy, 318
pregnancy, operation in, 108
section, delivery by, 300
methods, 300
in pregnancy, 99
in rupture of uterus, 329
results, 327
with sterilization, 314
wall, relaxation, after labor, correction, 422
Abortion, therapeutic, 66
anesthetic for, 67
technic of, 67
Abscess, multiple, complicating puerperal state, 434
of breast in newborn, 439
puerperal, 436
pelvic, Pryor's treatment, 431
surgical treatment, 430
stitch-hole, after celiohysterotomy, 314
Accouchement forcé, 71, 89
Acetonemia after anesthesia, 36, 37
Achondroplasia, 318
Acid, boric, 41
carbolic, 41
Acidosis after anesthesia, 36
Adherent placenta, removal of, 366, 367
Adrenalin in postpartum hemorrhage, 379
After-coming head, delivery of, by forceps, 153
manual method, 149
Amniotic fluid, escape of, into abdominal cavity, in celiohysterotomy, 310
Amputation of fetal parts to effect delivery, 253
Anatomy, 17
Anesthesia, 29, 35
acetonemia after, 36, 37
acidosis after, 36
by lumbar injection, 33
with eucain-adrenalin, 35
with scopolamin morphin, 34, 35
with stovain, 34
chloroform, 32
complications after, 36
effect of, on fetus, 35
ether, 30
bronchitis after, 36
pneumonia after, 36
ethyl chlorid, 30
heart failure during, treatment, 37
in forceps delivery, 183
in version, 213, 222
nitrous oxid, 30
recovery from, 33
spinal, 33
summary of results, 35
Anesthetizer, 29
Anteflexion of uterus, 51
in pregnancy, 18
Anteroposterior diameter of pelvic inlet, internal measurement, 72, 73
outlet, measurement, 70
Anteversion of uterus after labor, correction, 419
Antiseptic fluids, 41
bichlorid of mercury, 41
boric acid, 41
carbolic acid, 41
formalin, 41
lysol, 41
Aorta, abdominal, compression of, in postpartum hemorrhage, 380
Appendicitis in pregnancy, operation for, 93
Appendix, vermiform, in pregnancy, 24, 93

Argyrol in ophthalmia neonatorum, 41
Arm, fetal, manual delivery through vagina, 135
Asepsis of birth-canal, 24
of nipples, 41
of operator, 42
Asphyxia in newborn, 441
Assistants for obstetric operations, 49
Auvard's cranioclast, 243
Axis-traction forceps, 165
application, 165
Poulet's tapes with, 167
Tarnier's, 167

Bacillus coli communis, pyelitis from infection by, in pregnancy, 97
Bacteria in birth-canal, 24
Bag, de Ribes', 81
dilating, and bougies, induction of labor by means of, 78, 81
for dilation of cervix, 90
in placenta prævia, 391
sterilization of, 40
Bandage, Momburg's, in placental separation, 399
Basiotripsy, 247
Baumm's method of pubiotomy, 273
Bed, selection of, in private house, 46
Bichlorid of mercury, 41
Bipolar version, 221, 222, 223, 225
Birth-canal. See *Genital tract.*
Bladder during and after labor, 23
fetal bones in, 111
injury to, in pubiotomy, 272
irritation of, in ectopic pregnancy, 110
wounding of, in celiohysterotomy, 310
Bones, cranial, fractures of, from forceps, 202
fetal, in bladder, 111
Bony union after pubiotomy, failure of, 282
Boric acid, 41
Bossi's dilator for dilation of uterus, 89
Bougies, induction of labor by means of, 76
dilating bags with, 78, 81
technic, 79
sterilization of, 40
Brachial palsy in newborn, surgical treatment, 449
Braun's cranioclast, 244
Braun's hook, 253
Braxton-Hicks' method of version, 215
treatment of placenta prævia, 391
Breast, abscess of, in new-born, 439
puerperal, 436
Breech delivery, engagement in, 122
manual method, 136
complications, 159
with premature fetus, 161
version in, 226
Bronchitis after ether anesthesia, 36
Brow presentation, engagement in, 121, 123
Bumm's method of pubiotomy, 271, 272

Carbolic acid, 41
Carcinoma of uterus, 59
Cecum, position of, in pregnancy, 93
Celiohysterectomy with extraperitoneal treatment of stump, 320
chart of blood-pressure during, 324
complications, 325
hemorrhage in, control, 325
indications, 320
recovery from, 323
technic, 321
with intrapelvic treatment of stump, 315
abdominal dressing, 318
after-care of patient, 318
complications, 320
control of hemorrhage, 316
indications, 315
puerperal period after, 318
results, 320
technic, 315
Celiohysterotomy, 301
abdomen closed, 307, 309
abdominal dressing, 308, 309
after-care of patient, 311
application of forceps after, 194
bladder in, wounding of, 310
care of child after, 312
closing uterine incision, 305, 307
complications after, 313
complications during, 310
delivery of child, 303, 306
dilation of intestine after, 313
of stomach after, 313

Celiohysterotomy, escape of amniotic fluid into abdominal cavity in, 310
of intestine in, 310
forceps delivery after, 194
general care of mother after, 313
hemorrhage after, 313
hemorrhage in, control of, 305
in placenta prævia, 391, 393, 396
in suspected cases, 310
incising uterus, 302, 305
indications for, 301
pouring salt solution into uterus, 304, 307
relaxed uterus in, 310
removal of uterus from abdomen, 304
septic infection after, 314
stitch-hole abscess after, 314
technic of, 303
uterus closed and contracted, 306
turned out of abdominal cavity, 301
vaginal, 289
application of, 295
complications after, 292
for placenta prævia, 294
in vaginal delivery, 289
indications for, 291, 295
technic of, 289
version after, 229
wounding bladder in, 310
Cephalhematoma in newborn, 454
surgical treatment, 456
Cephalic version, 210
Cephalotribe, 245, 246
Cephalotripsy, 245
Cervical section in placenta prævia, 394
Cervix, dilation of, in version, 236
rapid and forcible, 89. See also *Uterus, dilation of.*
incision of, 287
lacerations of, immediate repair, 402
technic, 403
section of vaginal extraction preceded by, 287
torn, puerperal hemorrhage from, 385
Cesarean section, 301. See also *Celiohysterotomy.*
Child, care of, after celiohysterotomy, 312
in induced labor, 86
Chloroform anesthesia, 32
Cholecystotomy in pregnancy, 96
Circumcision in newborn, 460
complications, 462
Clavicle, fracture of, double, in newborn, 445
in newborn, 444, 445
Cleft palate in newborn, treatment, 457
Cleidotomy, 134, 249
Coccyx, injury to, from forceps, 202
Combined version, 210, 215. See also *Version, combined.*
Complications of breech extraction, 159
Confinement room, 45
Contracted pelvis, application of forceps in, 207
irregularly, 127
version in, results, 229
Cornual pregnancy, operation in, 109
Cranial bones, fractures of, from forceps, 202
Cranioclasis, 243
Cranioclast, Auvard's, 243
Braun's, 244
Craniotomy, 240
instruments for, 241
mortality of, 255
Smelley's scissors for, 241
unusual forms, 248
Cranium, fracture of, in version, 233
hematoma of, in newborn, 454, 456
treatment, 456
Cul-de-sac, vaginal, opening of, from forceps, 201
Cyst, ovarian, 62, 63

Decapitation, 253
Deformity of fetus, induction of labor for, 87
Delivery after pubiotomy, 269
breech, manual method, 136
complications, 159
with premature fetus, 161
by abdominal section, 300
methods, 300
forceps, 163. See also *Forceps delivery.*
of fetus through the vagina, 117
after-coming head, by forceps, 153
condition of lower birth-canal as indicating, 126
deformity in pelvic outlet in, 127
determining engagement, 118

Delivery of fetus through the vagina, determining engagement, 118
inertia in, 125
rupture of uterus in, 125
indications, 117
manual method, 130
after-coming head, 149
head, 130
lower extremities and breech, 136
presenting arm, 135
shoulders, 132
cleidotomy for, 134
trunk and upper extremities, 142
vaginal, incision into pelvic floor and perineum in, 299
of cervix in, 287
preceded by enlargement of birth-canal, 257
by section of cervix, 287
of lower uterine segment, 287
of perineum, 287
vaginal Cesarean section in, 289
De Ribes' bag, 81
Detachment, premature, of normally implanted placenta, 397. See also *Placenta, separation of.*
Development, congenital lack of, in newborn, 458
Diameter, anteroposterior, of pelvic outlet, measurement, 70
transverse, of pelvic outlet, measurement, 71
Diameters of fetal head, 77
of pelvic excavation, 78
inlet, 74
outlet, 70
Diastasis of recti muscles after labor, correction, 422
Dilating bags and bougies, induction of labor by means of, 78, 81
for dilation of cervix, 90
in placenta prævia, 391, 393
sterilization of, 40
Dilation of cervix in version, 236
of intestines after celiohysterotomy, 313
of stomach after celiohysterotomy, 313
rapid and forcible, of uterus, 89
Bossi's dilator for, 89
Dilation, rapid and forcible, of uterus, dilators for, 89
elastic bags for, 90
Harris's method, 90
laceration during, 91, 92
multiple incisions for, 90
Newell's dilator for, 90
Dilator, Bossi's, for dilation of uterus, 89
Newell's, for dilation of uterus, 90
Dislocation of eye in newborn, 458
of spleen in pregnancy, 24
Displacements of uterus, 51
after labor, correction of, technic, 422
cause, 51
correction of, after labor, with or without lacerations, 419
Döderlein's method of extraperitoneal section, 343–349
of pubiotomy, 270
Dressings, surgical, in private houses, 48

Ear, injuries to, in newborn, 457
Eclampsia, Edebohls' operation for, 98
Ectopic pregnancy, irritation of bladder in, 110
of rectum in, 110
operation for, 100–112
ruptured, operation in, 106, 107
suppurating, 110, 111
Edebohls' operation for eclampsia, 98
Elastic bag in placenta prævia, 391, 393
Electricity in control of postpartum hemorrhage, 381
Embryotomy, 237
frequency of, 254
general considerations concerning, 240
indications for, 238
mortality of, 255
results of, 254
Emmet's operation for repair of lacerations of pelvic floor, 416
Emptying uterus after viability and before full term, 69
before viability, 66
Enlargement of birth canal, vaginal extraction preceded by, 257
permanent, of pelvis, after pubiotomy, 276
Schickele's operation for, 282
postural, 257
Episiotomy, 299

Episiotomy in forceps delivery, 187
wounds, closure of, 410
Ether anesthesia, 30
bronchitis after, 36
pneumonia after, 36
Ethyl chlorid anesthesia, 30
Eucain-adrenalin anesthesia by lumbar injection, 35
Evisceration, 251
Exercise, influence of, on passage of child into pelvis, 260
Extirpation, total, of pregnant womb, 330
Extraction. See *Delivery.*
Extraperitoneal section by inguinal incision, 341
Döderlein's method, 343–349
Frank's method, 343
Jörg's method, 342
Ritgen's method, 342
Thomas' method, 342
Extra-uterine pregnancy, 100. See also *Ectopic pregnancy.*
Extremities, lower, and breech of fetus, manual method of vaginal delivery, 136
thrombophlebitis of, surgical treatment, 429
upper, and trunk of fetus, manual method of vaginal delivery, 142
fractures of, in newborn, 444
Eye, dislocation of, in newborn, 458
injuries to, in newborn, 458

Face, abrasions of, from forceps, 202
injuries to, in version, 233
lesions of, in newborn, 456
presentation, application of forceps in, 172, 173, 174, 175
engagement in, 123
Facial paralysis from forceps, 202
Fallopian tubes, operations on, 62
Femur, fractures of, in newborn, 448
Fetal bones in bladder, 111
débris in rectum, 111
head, diameters of, 77
Fetus, abrasions of face in, from forceps, 202
deformity of, induction of labor for, 87
delivery of, piecemeal, 254
through vagina, 117
Fetus, delivery of, through vagina, after-coming head, by forceps, 153
condition of lower birth-canal as indicating, 126
deformity in pelvic outlet in, 127
determining engagement, 118
inertia in, 125
rupture of uterus in, 125
indications, 117
manual method, 130
after-coming head, 149
head, 130
lower extremities and breech, 136
presenting arm, 135
shoulders, 132
cleidotomy for, 134
trunk and upper extremities, 142
effect of anesthesia on, 35
facial paralysis in, from forceps, 202
fractures of cranial bones in, from forceps, 202
injuries to, from forceps, 202
in version, 232
mortality and morbidity, after symphysiotomy, 266
mortality of, after pubiotomy, 276, 277
premature, breech extraction with, 161
results of pubiotomy for, 269, 276, 277
of symphyseotomy for, 266
retention of, after external version, 214
wounds of scalp in, from forceps, 202
Fibroid tumor of uterus, 56
as cause of inversion, 360
myomectomy for, 58
Fistula, uterine, method of making, in suprasymphyseal section, 334, 336
Flat pelvis, 125, 317, 326
Floating head, 117
kidney in pregnancy, 24
Forceps, 163
abrasions of face from, 202
application of, after Cesarean section, 194
after pubiotomy, 194
after suprasymphyseal extraperitoneal section, 194
after symphysiotomy, 194
dangerous, 174
high, 194

Forceps, application of, in contracted pelvis, 207
in face presentation, 172, 173, 174, 175
low, 194
middle, 194
mortality from, 203
repeated, 174
to presenting part, 171
with occiput posterior, 176, 177
as an instrument, 163
axis-traction, 165
application of, 165
Poulet's tapes with, 167
Tarnier's, 167
bad, 164
cephalic curve of, 165
complications caused by, 198
conditions making use justifiable, 179
contraindications for use, 181
dangerous application, 174
delivery, 163
abrasions of face in, 202
after Cesarean section, 194
after pubiotomy, 194
after suprasymphyseal extraperitoneal section, 194
after symphysiotomy, 194
anesthesia in, 183
application of forceps to presenting part, 171
axis-traction, 165
with Poulet's tapes, 167
with Tarnier's forceps, 167
complications, 198
conditions making justifiable, 179
contraindications, 181
dangerous application of forceps, 174
episiotomy in, 187
facial paralysis in, 202
fractures of cranial bones in, 202
frequency, 203
function of forceps, 178
gauze compress of hot bichlorid solution in, 186
high, 194
in contracted pelvis, 207
in face presentation, 172, 173, 174, 175
indications, 178
injuries caused by forceps, 198
Forceps delivery, injury to coccyx in, 202
to fetus in, 202
to umbilical cord in, 202
introduction of forceps, left blade, 184
locking blades, 185
right blade, 185
laceration of pelvic floor in, 201
of urethra in, 201
low, 194
Mercurio's position in, 193
middle, 194
mortality from, 203
of after-coming head, 153
opening of vaginal cul-de-sac from, 201
position of patient, 182
on side in, 190
preparation of forceps, 182
of patient, 182
repeated application of forceps, 174
results, 203
rotation with forceps in, 177
deficient, 195
separation of symphysis pubis in, 201
technic, 182
traction in, 186
variations in, 189
Walcher's position in, 193
with occiput posterior, 176, 177
wounds of scalp in, 202
essential portions, 164
facial paralysis from, 202
fractures of cranial bones from, 202
frequency of use, 203
function of, 178
good, 164
indications for use, 178
injuries from, 198
injury to coccyx from, 202
to fetus from, 202
to umbilical cord from, 202
laceration of pelvic floor from, 201
of urethra from, 201
lock of, 164
mortality from use of, 203
Naegele, 164
opening of vaginal cul-de-sac from, 201
pelvic curve of, 165
repeated application, 174
results of use, 203

Forceps, rotation with, 177
deficient, 195
separation of symphysis pubis from, 201
Simpson, 163
tape attachment and traction bar, 168
without traction bar, 167
slipping from unengaged head, 180, 181
solid-bladed, 164
sterilization of, 182
Tarnier's, 163, 166
wounds of scalp from, 202
Formalin solution, 41
Fracture, greenstick, in newborn, 446
in newborn, surgical treatment, 444
of clavicle, double, in newborn, 445
in newborn, 444, 445
of cranial bones from forceps, 202
of cranium in version, 233
of femur in newborn, 448
of humerus in newborn, 447
in version, 232
of thigh in version, 232
of upper extremities in newborn, 444
Frank's method of extraperitoneal section, 343
Fungous growths of umbilicus in newborn, 459, 460

Gall-bladder, infection of, in pregnancy, 96
Gauze, induction of labor by means of, 77
Genital tract, asepsis of, 24
bacteria in, 24
enlargement, vaginal extraction preceded by, 257
in pregnancy, anatomy, 17
lacerations of, immediate repair, 401
accidents and complications after, 412
intermediate repair, 413
late repair, 414
repair, after-treatment, 423
hemorrhage after, 424
infection after, 424
patient's convalescence after, 424
technic, 422
lower, condition of, as indicating vaginal delivery, 126
Genital tract, return to normal condition after labor, 22
Gloves, rubber, sterilization of, 41
Glycerin, sterile, induction of labor by means of, 77
Greenstick fracture in newborn, 446

Hands, sterilization of, 42
Hare-lip in newborn, treatment, 457
Harris' method for rapid dilation of cervix, 90
Head, after-coming, delivery of, by forceps, 153
manual method, 149
fetal, diameters of, 77
manual extraction through vagina, 130
floating, 117
injuries to, in version, 233
Heart-failure during anesthesia, treatment, 37
Hebosteotomy, 267. See also *Pubiotomy.*
Hematoma of cranium in newborn, 454, 456
treatment, 456
of sternocleidomastoid muscle in newborn, 454, 456
treatment, 456
of vagina after labor, 388
Hemorrhage after celiohysterotomy, 313
after labor, control, 376
adrenalin, 379
application of clamps to lacerations in cervix, 379
complicated by toxemia, 379
compression of abdominal aorta, 380
electricity, 381
packing uterus with gauze, 376
Sigwart's method, 380
from lacerations in anterior segment of pelvic floor, 389
in posterior segment of pelvic floor, 387
from rupture of uterus, 381
from torn cervix, 385
late, 384
secondary, 382
duty of nurse, 382, 383
after repair of lacerations of genital tract, 424

Hemorrhage, control of, after labor, 376. See also *Hemorrhage after labor.*
in labor, 371
from hemorrhoidal veins in labor, 389
in celiohysterectomy, control, 316
in celiohysterotomy, control of, 305
in labor, conditions preventing and controlling, 27
control, 371
in Porro operation, control, 325
in pubiotomy, 271, 272
into retina in newborn, 458
late, after labor, 384
of scalp in newborn, surgical treatment, 453
postpartum, control of, 376. See also *Hemorrhage after labor.*
umbilical, in newborn, 442
Hemorrhoidal veins, hemorrhage from, in labor, 389
Hemorrhoids in pregnancy, 66
Hernia of uterus, 55
umbilical, in newborn, 443
High application of forceps, 194
Hook, Braun's, 253
Hospitals, obstetric operations in, 39
Houses, private, appliances for operations in, 47
obstetric operations in, 45
operating tables in, 46
selection of bed in, 46
sterilization in, 47
surgical dressings in, 48
water supply in, 47
Humerus, fractures of, in newborn, 447
in version, 232
Hydrosalpinx, 62
Hysterectomy in pregnancy, 330
in puerperal septic infection, 427
in rupture of uterus, 329

Immobilization of pelvis after pubiotomy, 271
after symphyseotomy, 265
at time of symphyseotomy, 265
Incision into pelvic floor and perineum, 299
of cervix, 287
Incubator, 87
Indentation of skull in newborn, 444
Induction of labor, 69
Induction of labor as a preliminary to other operations, 86
by means of bougies, 76
dilating bags with, 78, 81
technic, 79
of gauze, 77
of sterile glycerin, 77
care of child in, 86
choice, 86
for fetal deformity, 87
indications, 69, 84
methods, 76
results, 83
rupture of membranes in, 82
technic, 79
termination, 82
test of labor, 76
time for, 71
Müller's method, 72, Fig. 50
value, 84
Inertia uteri in determining engagement in vaginal delivery, 125
Infants, preparation for care, in hospitals, 44
Infection after repair of lacerations of genital tract, 424
in newborn, surgical treatment, 459
of umbilicus in newborn, 459, 460
septic, after celiohysterotomy, 314
puerperal, 424. See also *Puerperal septic infection.*
Inlet, pelvic, anteroposterior diameter, internal measurement, 72, 73
diameters of, 74
Instruments, 41
for craniotomy, 241
sterilization of, in hospitals, 40
Intestine, dilation of, after celiohysterotomy, 313
escape of, in celiohysterotomy, 310
Inversion of uterus, 359
caused by fibroids complicating pregnancy, 360
caused by tumors complicating pregnancy, 360
causes, immediate, 359
conditions predisposing to, 359
prophylaxis, 361
results, 361
signs, 360
symptoms, 360

Inversion of uterus, treatment, 361
Iodin, solution of tincture of, for irrigating uterus, 41

Jörg's method of extraperitoneal section, 342
Justominor pelvis, 126

Kidney, floating, in pregnancy, 24
operations on, in pregnancy, 97
prolapse of, in pregnancy, 24
surgical, treatment of, 434
King's position in spontaneous version, 234, 235
Knee-chest position, 259, 260
Kyphotic pelvis, 325

Labor, bladder during and after, 23
control of hemorrhage after, 376
adrenalin, 379
application of clamps to lacerations in cervix, 379
complicated by toxemia, 379
compression of abdominal aorta, 380
electricity, 381
packing uterus with gauze, 376
Sigwart's method, 380
control of hemorrhage in, 371
hematoma of vagina after, 388
hemorrhage after, control, 376. See also *Labor, control of hemorrhage after.*
from lacerations in anterior segment of pelvic floor, 389
in posterior segment of pelvic floor, 387
from rupture of uterus, 381
from torn cervix, 385
late, 384
secondary, 382
duty of nurse, 382, 383
from hemorrhoidal veins in, 389
hemorrhage in, conditions preventing and controlling, 27
control, 371
induction of, 69
as a preliminary to other operations, 86
by means of bougies, 76
dilating bags with, 78, 81
Labor, induction of, by means of bougies, technic, 79
of gauze, 77
of sterile glycerin, 77
care of child in, 86
choice, 86
for fetal deformity, 87
indications, 69, 84
methods, 76
results, 83
rupture of membranes in, 82
technic, 79
termination, 82
test of labor, 76
time for, 71
Müller's method, 72, Fig. 50
value, 84
knee-chest position in, 259, 260
lateral position in, 259
pelvic floor during, 21
perineum during, 21
position of uterus after, 22
during, 19
rectum during and after, 23
return of birth-canal to normal condition after, 22
of uterus to normal position after, 22
secondary hemorrhage after, 382
duty of nurse, 382, 383
sitting position in, 260
squatting position in, 260
surgery of, 117
test of, in induction of labor, 76
thrombosis of vagina after, 388
twin, removal of placenta after, 369
vagina during, 21
Walcher's position in, 258, 259
Laceration during dilation of cervix, 91, 92
in anterior segment of pelvic floor, postpartum hemorrhage from, 389
in posterior segment of pelvic floor, postpartum hemorrhage from, 387
of anterior segment of pelvic floor, immediate repair, 410
secondary repair, 417
of cervix, immediate repair, 402
technic, 403
of genital tract, immediate repair, 401
accidents and complications after, 412

Laceration of genital tract, intermediate repair, 413
late repair, 414
repair, after treatment, 423
hemorrhage after, 424
infection after, 424
patient's convalescence after, 424
technic, 422
of pelvic floor, 65
complete, immediate repair, 408
repair of, after-treatment, 423
secondary repair, 417
Emmet's operation for repair, 416
from forceps, 201
immediate repair, complications after, 411
late repair, 416
of perineum, 65
complete, immediate repair, 408
repair of, after-treatment, 423
secondary repair, 417
immediate repair, 407
complications after, 411
unusual, closure of, 411
of posterior segment of pelvic floor and perineum, immediate repair, 404
of urethra from forceps, 201
of uterus, repair, 56
Laparo-elytrotomy, 342
Lateral position, 259
Leg, milk, surgical treatment, 429
Ligature material, 44
Locomotion, disturbances of, after pubiotomy, 283
Low application of forceps, 194
Lower extremity, thrombophlebitis of, surgical treatment, 429
Lumbar injection, anesthesia by, 33
with eucain-adrenalin, 35
with scopolamin morphin, 34, 35
with stovain, 34
Lysol, 41

Mastitis in newborn, 439
puerperal, 436
treatment of, 437
Measurement, internal, of anteroposterior diameter of pelvic inlet, 72, 73
of anteroposterior diameter of pelvic outlet, 70
Measurement of transverse diameter of pelvic outlet, 71
Membranes, rupture of, in induced labor, 82
in placenta prævia, 395
Mercurio's position, 257
in forceps delivery, 193
Mercury, bichlorid of, 41
Middle application of forceps, 194
Milk leg, surgical treatment, 429
Momburg's bandage in placental separation, 399
Müller's method of estimating time for induction of labor, 72, Fig. 50
Multiple abscess complicating puerperal state, 434
Muscle, sphincter, immediate repair, 407
sternocleidomastoid, in newborn, hematoma of, 454, 456
surgical treatment, 456
Muscles, recti, diastasis of, after labor, correction, 422
Myomectomy for fibroid tumor of uterus, 58

Naegele forceps, 164
Newborn, abscess of breast in, 439
asphyxia in, 441
brachial palsy in, surgical treatment, 449
cephalhematoma in, 454
surgical treatment, 456
circumcision in, 460
complications, 462
cleft palate in, treatment, 457
congenital lack of development, 458
dislocation of eye in, 458
fracture of clavicle in, 444, 445
double, 445
of femur in, 448
of humerus in, 447
fractures in, surgical treatment, 444
of upper extremities in, 444
fungous growths of umbilicus in, 459, 460
greenstick fracture in, 446
hare-lip in, treatment, 457
hematoma of cranium in, 454, 456
treatment, 456
hemorrhage into retina in, 458
of scalp in, surgical treatment, 453

Newborn, indentation of skull in, 444
infection in, surgical treatment, 459
of umbilicus in, 459, 460
injuries to ear in, 457
to eye in, 458
to scalp in, surgical treatment, 453
lesions of face in, 456
mastitis in, 439
surgery of, 441
torticollis in, 456
treatment, 456
umbilical hemorrhage in, 442
hernia in, 443
wounds of ear in, 457
of eye in, 458
of face in, 457
Newell's dilator for dilation of uterus, 90
Nipples, asepsis of, 41
Nitrate of silver in ophthalmia neonatorum, 41
Nitrous oxid anesthesia, 30
Nurse, duty of, in secondary postpartum hemorrhage, 382, 383
Nursing, 50

Open symphyscotomy, 264
Operating tables in hospitals, 39
in private houses, 46
Operating-room in hospitals, 39
cleaning and fumigation, 45
Operator, asepsis of, 42
Ophthalmia neonatorum, argyrol in, 41
nitrate of silver in, 41
Outlet, pelvic, anteroposterior diameter, measurement, 70
deformity in, in vaginal delivery, 127
diameters of, 70
transverse diameter, measurement, 71
Ovarian pregnancy, operation in, 109
Ovaries, cysts of, 62, 63
operations on, 62
tumors of, 64
Ovariotomy, 64

Palate, cleft, in newborn, treatment, 457
Paralysis, brachial, in newborn, surgical treatment, 449
facial, from forceps, 202
Parietal presentation, anterior, 121
Parietal presentation, posterior, 121
Patients, preparation of, in hospitals, 43
Pelvic abscess, Pryor's treatment, 431
surgical treatment, 430
excavation, diameters of, 78
floor, anterior segment, lacerations of, hemorrhage after labor from, 389
immediate repair, 410
secondary repair, 418
during labor, 21
incision into, 299
lacerations of, 65
complete, immediate repair, 408
repair of, after-treatment, 423
secondary repair, 417
Emmet's operation, 416
from forceps, 201
immediate repair, complications after, 411
late repair, 416
operations on, 65
posterior segment, lacerations of, hemorrhage after labor from, 387
immediate repair, 404
inlet, anteroposterior diameter, internal measurement, 72, 73
diameters of, 74
outlet, anteroposterior diameter, measurement, 70
deformity of, in vaginal delivery, 127
diameters of, 70
transverse diameter, measurement, 71
thrombophlebitis, surgical treatment, 428
Trendelenburg's operation for, 428
viscera, prolapse of, after labor, correction, 420
Pelvis, condition of, after pubiotomy, 281
contracted, application of forceps in, 207
irregularly, 127
version in, results, 229
enlargement of, permanent, after pubiotomy, 276
Schickele's operation for, 282
flat, 125, 317, 326
immobilization of, after pubiotomy, 271

Pelvis, immobilization of, after symphyseotomy, 265
at time of symphyseotomy, 265
justominor, 126
kyphotic, 325
mobility of, in pregnancy, 257
rachitic, 317, 319
section of, 261
Perineum during labor, 21
incision into, 299
lacerations of, 65
complete, immediate repair, 408
repair of, after-treatment, 423
secondary repair, 417
immediate repair, 407
complications after, 411
unusual closure, 411
operations on, 65
section of, vaginal extraction preceded by, 287
Peritonitis, puerperal, 431
surgical treatment, 432
Pfannenstiel's incision in suprasymphyseal section, 334
treatment of placenta prævia, 391
Piles in pregnancy, 66
Placenta, adherent, removal of, 366, 367
detachment of, in version, 232
normally implanted, premature detachment, 397. See also *Placenta, separation of.*
prævia, 390
Braxton-Hicks' treatment, 391
central, 373, 390
cervical section in, 394
Cesarean section in, 391, 393, 396
combined version for, 215
complete, 373, 390
dilating bag in, 391, 393
incomplete, 390
source of bleeding in, 374
partial, 390
Pfannenstiel's treatment, 391
rupture of membranes in, 395
tampon in, 391
treatment, 390
conservative results of, 392
vaginal Cesarean section for, 294
tampon in, 374
removal of, 365
manual, after uterine rupture, 368
Placenta, removal of, manual, by pulling upon umbilical cord, 370
in twin labor, 369
indications for, 365
methods for, 366
precautions in, 367
separation of, 397
Momburg's bandage in, 399
mortality, 398
rotunda treatment, 399
symptoms, 398
tampon in, 398, 399
treatment, 398
Plexus, brachial, in newborn, injuries to, 449
Pneumonia after ether anesthesia, 36
Podalic version, 210, 220, 224
Polk's operation for prolapse of uterus, 420
Polyps of uterus, removal, 59
Porro's operation, 320
blood-pressure during, chart of, 324
complications, 325
hemorrhage in, control, 325
indications, 320
recovery from, 323
technic, 321
Position in forceps delivery, 182
King's, in spontaneous version, 234, 235
knee-chest, 259, 260
lateral, 259
Mercurio's, 257
in forceps delivery, 193
of cecum in pregnancy, 93
of vermiform appendix in pregnancy, 93
on side in forceps delivery, 190
sitting, 260
squatting, 260
Walcher's, 258, 259
in forceps delivery, 193
Postpartum hemorrhage, control, 376
adrenalin, 379
application of clamps to lacerations in cervix, 379
complicated by toxemia, 379
compression of abdominal aorta, 380
electricity, 381
packing uterus with gauze, 376

Postpartum hemorrhage, control, Sigwart's method, 380
from lacerations in anterior segment of pelvic floor, 389
in posterior segment of pelvic floor, 387
from rupture of uterus, 381
from torn cervix, 385
late, 384
secondary, 382
duty of nurse, 382, 383
Postural enlargement, 257
Poulet's tapes with axis-traction forceps, 167
Pregnancy, abdomen during, 23
abdominal operation in, 99, 108
anesthesia during, 29. See also *Anesthesia.*
anteflexion of uterus in, 18, 51
appendicitis in, operation for, 93
asepsis of birth-canal in, 24
bacteria in birth-canal during, 24
birth-canal in, anatomy, 17
asepsis of, 24
bacteria in, 24
carcinoma of uterus in, 59
cholecystotomy in, 96
cornual, operation in, 109
cysts of ovaries in, 62, 63
dislocation of spleen in, 24
displacements of uterus in, 51
cause, 51
eclampsia in, Edebohls' operation for, 98
ectopic, irritation of bladder in, 110
of rectum in, 110
operation for, 100–112
rupture of, operation in, 106, 107
suppurating, 110, 111
exercise in, value of, 260
extirpation of uterus in, 330
extra-uterine, 100. See also *Pregnancy, ectopic.*
fibroid tumor of uterus in, 56
myomectomy for, 58
floating kidney in, 24
hemorrhoids in, 66
hernia of uterus in, 55
hydrosalpinx in, 62
hysterectomy in, 330
infection of gall-bladder in, 96
Pregnancy, knee-chest posture in, 259, 260
laceration of pelvic floor in, 65
of perineum in, 65
of uterus in, repair, 56
lateral position in, 259
Mercurio's posture in, 257
mobility of pelvis in, 257
operations on Fallopian tubes in, 62
on kidneys in, 97
on ovaries in, 62
on pelvic floor in, 65
on perineum in, 65
on rectum in, 66
ovarian, operation in, 109
tumors in, 64
ovariotomy in, 64
piles in, 66
polyps of uterus in, removal, 59
position of cecum in, 93
of uterus during development, 17
of vermiform appendix in, 93
prolapse of kidney in, 24
of uterus in, 55
pyelitis in, 97
retroflexion of uterus in, 17, 51
retroversion of uterus in, 51
retaining uterus in normal position after replacement, 54
salpingitis in, 62
chronic, 63
sitting posture in, 260
size of uterus in, 18
squatting posture in, 260
surgery of, 28, 51
tubal, operation in, 109
tumors complicating, inversion of uterus caused by, 360
of ovary in, 64
of uterus in, removal, 56
uterus in, size of, 17
value of exercise in, 260
vermiform appendix in, 24
Walcher position in, 258, 259
Premature detachment of normally implanted placenta, 397. See also *Placenta, separation of.*
fetus, breech extraction with, 161
Preparation of patients in hospitals, 43
Presentation, breech, engagement in, 122
version in, 226

Presentation, brow, engagement in, 121, 123
face, application of forceps in, 172, 173, 174, 175
engagement in, 123
parietal, anterior, 120
posterior, 121
shoulder, impacted, combined version for, 217
Private houses, appliances for operation in, 47
obstetric operations in, 45
operating tables in, 46
selection of bed in, 46
sterilization in, 47
surgical dressings in, 48
water supply in, 47
Prolapse of kidney in pregnancy, 24
of pelvic viscera after labor, correction, 420
of urethra, repair, 418
of uterus, 55
Polk's operation for, 420
Prophylactic version, 210
Pryor's treatment of pelvic abscess, 431
Pubiotomy, 267
advantages of, 269
Baumm's method, 273
bony union after, failure of, 282
Bumm's method, 271, 272
complications of, 270
condition of pelvis after, 281
delivery after, 269
disadvantages of, 269
disturbances of locomotion after, 283
Döderlein's method, 270
double, 269
enlargement of pelvis after, permanent, 276
Schickele's operation for, 282
failure of bony union after, 282
forceps delivery after, 194
hemorrhage in, 271, 272
immobilization of pelvis after, 271
indications for, 267
injury to bladder in, 272
mortality from, 272, 275, 277
open method, 274
pelvis after, 281
permanent enlargement of pelvis after, 276
Pubiotomy, permanent enlargement of pelvis after, Schickele's operation for, 282
place of, as an operation, 272
repeated, 269
results of, for child, 269, 276, 277
subcutaneous, 268
technic of, 267, 270
thrombosis after, 277
version after, 229
Puerperal mastitis, 436
treatment, 437
peritonitis, 431
surgical treatment, 432
septic infection, complete extirpation of uterus for, 427
emptying septic uterus, 425
hysterectomy for, 427
surgery of, 424
Puerperium, multiple abscess complicating, 434
surgery of, 365
Pyelitis in pregnancy, 97

Rachitic pelvis, 317, 319
Recti muscles, diastasis of, after labor, correction, 422
Rectum during and after labor, 23
fetal débris in, 111
irritation of, in ectopic pregnancy, 110
operations on, 66
Relaxation of abdominal wall after labor, correction, 422
Results of induced labor, 83
Retina, hemorrhage into, in newborn, 458
Retroflexion of uterus, 51
in pregnancy, 17
Retroversion of uterus, 51
after labor, 419
retaining uterus in normal position after replacement, 54
Ritgen's method of extraperitoneal section, 342
Room, confinement, 45
operating-, in hospitals, 39
cleaning and fumigation, 45
Rotation with forceps, 177
deficient, 195
Rotunda method of treating placental separation, 399
Rubber gloves, sterilization of, 41

Rupture of membranes in induced labor, 82
in placenta prævia, 395
of ectopic pregnancy, operation in, 106, 107
suppurating, 110, 111
of uterus, 349
danger of, in combined version, 220
in version, 232
emptying uterus and use of tampon in, 328
etiology, 349
hemorrhage after labor from, 381
hysterectomy in, 329
in determining engagement in vaginal delivery, 125
morbidity, 356
mortality, 356
natural history, 350
prevention, 352
removal of placenta after, 368
signs, 350
symptoms, 350, 351
threatened, symptoms, 351
treatment, 328, 353
results, 330
varieties, 349

Salpingitis, 62
chronic, 63
Salt solution in celiohysterotomy, 304, 307
Scalp, hemorrhage of, in newborn, surgical treatment, 453
injuries to, in newborn, surgical treatment, 453
wounds of, from forceps, 202
Schickele's operation for permanent enlargement of pelvis after pubiotomy, 282
Scissors, Smelley's, for craniotomy, 241
Scopolamin-morphin anesthesia by lumbar injection, 34, 35
Section, abdominal, delivery by, 300
methods, 300
in pregnancy, 99
in rupture of uterus, 329
results, 327
with sterilization, 314
cervical, in placenta prævia, 394
Section, Cesarean, 301. See also *Celiohysterotomy.*
extraperitoneal, by inguinal incision, 341
Döderlein's method, 343–349
Frank's method, 343
Jörg's method, 342
Ritgen's method, 342
Thomas' method, 342
of cervix, vaginal extraction preceded by, 287
of lower uterine segment, vaginal extraction preceded by, 287
of perineum, vaginal extraction preceded by, 287
suprasymphyseal, 333
advantages of, 335
disadvantages of, 335
extraperitoneal, application of forceps after, 194
in septic cases, 336
Pfannenstiel's incision in, 334
results of, 335
Sellheim's method, 335
of making uterine fistula in, 334, 336
technic of, 334
version after, 229
through lower uterine segment, version after, 229
Segment, anterior, of pelvic floor, lacerations, immediate repair, 410
secondary repair, 418
posterior, of pelvic floor, lacerations, immediate repair, 404
uterine, lower, section of, vaginal extraction preceded by, 287
Sellheim's method of making uterine fistula in suprasymphyseal section, 334, 336
of suprasymphyseal section, 335
Separation of placenta, 397. See also *Placenta, separation of.*
Septic infection after celiohysterotomy, 314
puerperal, 424. See also *Puerperal septic infection.*
Shoulder presentation, impacted, combined version for, 217
Shoulders, fetal, manual extraction through vagina, 132

Sigwart's method of controlling postpartum hemorrhage, 380
Silver nitrate in ophthalmia neonatorum, 41
Simpson's forceps, 163
tape attachment and traction bar, 168
without traction bar, 167
Sitting position, 260
Skull, indentation of, in newborn, 444
Smelley's scissors for craniotomy, 241
Sphincter muscle, immediate repair, 407
Spinal anesthesia, 33
Spleen, dislocation of, in pregnancy, 24
Spontaneous version, 233
King's position in, 234, 235
Squatting position, 260
Sterilization, abdominal section with, 314
apparatus for, in hospitals, 40
in private houses, 47
of bougies, 40
of dilating bags, 40
of forceps, 182
of hands, 42
of instruments in hospitals, 40
of rubber gloves, 41
Sternocleidomastoid muscle, hematoma of, in newborn, 454, 456
treatment, 456
Stitch-hole abscess after celiohysterotomy, 314
Stomach, dilation of, after celiohysterotomy, 313
Stovain anesthesia by lumbar injection, 34
Subcutaneous pubiotomy, 268
symphyseotomy, 264
Suprasymphyseal section, 333
advantages, 335
disadvantages, 335
extraperitoneal, use of forceps after, 194
in septic cases, 336
Pfannenstiel's incision in, 334
results, 335
Sellheim's method, 335
of making uterine fistula in, 334, 336
technic, 334
version after, 229
Surgical dressings in private houses, 48
Surgical kidney, treatment, 434
Suture, immediate, of lacerations of anterior segment of pelvic floor, 410
of genital tract, 401
of pelvic floor, complications after, 411
of perineum, complications after, 411
intermediate, of lacerations of genital tract, 413
late, of lacerations of genital tract, 414
material, 44
of complete lacerations of pelvic floor, immediate, 408
of perineum, immediate, 408
of episiotomy wounds, 410
of lacerations of cervix, immediate, 402
technic of, 403
of genital tract, after-treatment, 423
hemorrhage after, 424
infection after, 424
patient's convalescence after, 424
technic, 422
of perineum, immediate, 407
of posterior segment of pelvic floor and perineum, 404
of prolapse of urethra, 418
of sphincter muscle, immediate, 407
secondary, of complete lacerations of pelvic floor, 417
of perineum, 417
of lacerations of anterior segment of pelvic floor, 418
Symphyseotomy, 261
accidents of, 265
complications of, 265
fetal mortality and morbidity after, 266
forceps delivery after, 194
immobilization of pelvis after, 265
at time of, 265
indications for, 262
methods of, 263
mortality and morbidity, 266
fetal, 266
open, 264
results of, 265
for child, 266
permanent, 266
subcutaneous, 264

Symphyseotomy without extraction, 267
Symphysis pubis, separation of, from forceps, 201

Tables, operating, in hospitals, 39
in private houses, 46
Tampon in placenta prævia, 391
in placental separation, 398, 399
intra-uterine, in postpartum hemorrhage, 376
vaginal, in placenta prævia, 374
Tapes, Poulet's, with axis-traction forceps, 167
Tarnier's forceps, 163, 166, 167
Technic of obstetric surgery, 39
Termination of induced labor, 82
Tests of labor in induction of labor, 76
Therapeutic abortion, 66
anesthetic for, 67
technic, 67
Thigh, fracture of, in version, 232
Thomas' method of extraperitoneal section, 342
Thorn's method for converting a face into a vertex presentation, 212
Thrombophlebitis of lower extremity, surgical treatment, 429
pelvic, surgical treatment, 428
Trendelenburg's operation for, 428
Thrombosis after pubiotomy, 277
of vagina after labor, 388
Tincture of iodin solution for irrigating uterus, 41
Torticollis in newborn, 456
treatment, 456
Toxemia complicating postpartum hemorrhage, control, 379
Tracheotomy for asphyxia in newborn, 441
Transverse diameter of pelvic outlet, measurement, 71
Trendelenburg's operation for pelvic thrombophlebitis, 428
Trephine, 242, 243
Trunk and upper extremities of fetus, manual method of vaginal delivery, 142
Tubal pregnancy, operation in, 109
Tumors complicating pregnancy, inversion of uterus caused by, 360
fibroid, of uterus, 56
myomectomy for, 58
Tumors of uterus, removal, 56
ovarian, 64
Twin labor, removal of placenta in, 369

Umbilical cord, injury to, from forceps, 202
in version, 228, 233
pulling upon, for removal of placenta, 370
hemorrhage in newborn, 442
hernia in newborn, 443
Umbilicus, fungous growths of, in newborn, 459, 460
infection of, in newborn, 459, 460
Upper extremities, fractures of, in newborn, 444
Urethra, laceration of, from forceps, 201
prolapse of, repair, 418
Uterine fistula, method of making, in suprasymphyseal section, 334, 336
tampon to control postpartum hemorrhage, 376
Uterus, anteflexion of, 51
in pregnancy, 18
anteversion of, after labor, correction, 419
carcinoma of, 59
closure of, after celiohysterotomy, 305, 307
dilation of, rapid and forcible, 89
Bossi's dilator for, 89
dilators for, 89
elastic bags for, 90
Harris's method, 90
laceration during, 91, 92
multiple incisions for, 90
Newell's dilator for, 90
displacements of, 51
after labor, correction, technic of, 422
with or without lacerations, 419
cause, 51
emptying of, after viability and before full term, 69
before viability, 66
fibroid tumors of, 56
as cause of inversion, 360
myomectomy for, 58
hernia of, 55
incision of, in celiohysterotomy, 302, 305

Uterus, inversion of, 359
caused by fibroids complicating pregnancy, 360
by tumors complicating pregnancy, 360
causes, immediate, 359
conditions predisposing to, 359
prophylaxis, 361
results, 361
signs, 360
symptoms, 360
treatment, 361
lacerations of, repair, 56
packing of, with gauze, to control hemorrhage after labor, 376
polyps of, removal, 59
position of, after labor, 22
during development, 17
during labor, 19
pregnant, total extirpation, 330
prolapse of, 55
Polk's operation for, 420
rapid and forcible dilation, 89
relaxed, in celiohysterotomy, 310
retroflexion of, 51
in pregnancy, 17
retroversion of, 51
after labor, 419
retaining uterus in normal position after replacement, 54
return to normal position after labor, 22
rupture of, 349
abdominal section in, 329
danger, in combined version, 220
in version, 232
emptying uterus and use of tampon in, 328
etiology, 349
hemorrhage after labor from, 381
hysterectomy in, 329
in determining engagement in vaginal delivery, 125
morbidity, 356
mortality, 356
natural history, 350
prevention, 352
removal of placenta after, 368
signs, 350
symptoms, 350, 351
threatened, symptoms, 351
Uterus, rupture of, treatment, 328, 353
results, 330
varieties, 349
segment of, lower, section of, vaginal extraction preceded by, 287
size of, in pregnancy, 18
tumors of, removal, 56

Vagina during labor, 21
hematoma of, after labor, 388
thrombosis of, after labor, 388
Vaginal Cesarean section, 289
application of, 295
complications after, 292
for placenta prævia, 294, 393
indications, 291, 295
technic, 289
version after, 229
cul-de-sac, opening of, from forceps, 201
delivery of fetus, 117
after-coming head, by forceps, 153
condition of lower birth-canal as indicating, 126
deformity of pelvic outlet in, 127
determining engagement, 118
inertia in, 125
rupture of uterus in, 125
incision into pelvic floor and perineum in, 299
of cervix in, 287
indications, 117
manual method, 130
after-coming head, 149
head, 130
lower extremities and breech, 136
presenting arm, 135
shoulders, 132
cleidotomy for, 134
trunk and upper extremities, 142
preceded by enlargement of birth-canal, 257
by section of cervix, 287
of lower uterine segment, 287
of perineum, 287
vaginal Cesarean section in, 289
tampon in placenta prævia, 374
Veins, hemorrhoidal, hemorrhage from, in labor, 389

Vermiform appendix in pregnancy, 24
position of, in pregnancy, 93
Version, 210
after pubiotomy, 229
after section through lower uterine segment, 229
after suprasymphyseal section, 229
after vaginal Cesarean section, 229
anesthesia in, 213, 222
bipolar, 221, 222, 223, 225
Braxton-Hicks' method, 215
cephalic, 210
combined, 210, 215
danger of uterine rupture in, 220
for impacted shoulder presentation, 217
for placenta prævia, 215
indications for, 215
preparation for, 215
danger of uterine rupture in, 232
detachment of placenta in, 232
dilation of cervix in, 236
external, 210, 214
advantages of, 215
retention of child after, 214
fracture of cranium in, 233
of humerus in, 232
of thigh in, 232
in breech presentation, 226
in contracted pelvis, results, 229
indications for, 210, 220
infection in, 233
Version, injuries to face in, 233
to fetus in, 232
to head in, 233
to umbilical cord in, 228, 233
internal, 210, 220
mortality from, 230
podalic, 210, 220, 224
position of patient in, 221
preparation of patient for, 213
prognosis of, 236
prophylactic, 210
results of, 229
spontaneous, 233
King's position in, 234, 235
successful, essentials for, 213
technic of, 221
Thorn's method, 212
varieties of, with reference to fetus, 210
to mother, 210
Viscera, pelvic, prolapse of, after labor, correction, 420

Walcher's position, 258, 259
in forceps delivery, 193
Water supply in private houses, 47
Wounds, episiotomy, closure of, 410
of ear in newborn, 457
of eye in newborn, 458
of face in newborn, 456
of scalp from forceps, 202
in newborn, surgical treatment, 453

SAUNDERS' BOOKS

on

Nervous and Mental Diseases, Children, Hygiene, Nursing, and Medical Jurisprudence

W. B. SAUNDERS COMPANY

WEST WASHINGTON SQUARE PHILADELPHIA

9, HENRIETTA STREET COVENT GARDEN, LONDON

THE SUPERIORITY OF SAUNDERS' TEXT-BOOK

In a series of articles entitled

"WHAT ARE THE BEST MEDICAL TEXT-BOOKS?"

a well known medical journal compiled a tabulation of the text-books recommended in those schools which are members of the American Association of Medical Colleges. The text-books were divided into twenty (20) subjects and under each subject was given a list of the various books with the number of times each book is recommended. Saunders' books head ten (10) of the twenty (20) subjects, the largest number headed by any other publisher being three (3). In other words, Saunders' books lead in as many subjects as the books of all the other publishers combined.

A Complete Catalogue of Our Publications will be Sent upon request

Church and Peterson's Nervous and Mental Diseases

Nervous and Mental Diseases. By ARCHIBALD CHURCH, M. D., Professor of Nervous and Mental Diseases and Medical Jurisprudence, Northwestern University Medical School, Chicago; and FREDERICK PETERSON, M. D., President New York State Commission on Lunacy; Professor of Psychiatry at the College of Physicians and Surgeons, N. Y. Handsome octavo, 934 pages; 341 illustrations. Cloth, $5.00 net; Half Morocco, $6.50 net.

THE NEW (7th) EDITION

For this new seventh edition the entire work has been most thoroughly revised. To show with what thoroughness the authors have revised their work, we point out that in the nervous section alone over one hundred and fifty interpolations have been made, and, in addition, well over three hundred minor corrections. The chapters on Meningitis, Aphasia, Poliomyelitis, Pellagra, and Pituitary Diseases have been practically rewritten. A chapter on Oppenheim's Congenital Amyatonia has been introduced. The section on Mental Diseases has been wholly rearranged to conform to the latest classification, some obsolete matter struck out, and much new matter added. A number of chapters have been rewritten. This seventh edition embodies every substantial advance in the domains of nervous and mental diseases.

OPINIONS OF THE MEDICAL PRESS

American Journal of the Medical Sciences

"This edition has been revised, new illustrations added, and some new matter, and really is two books. . . . The descriptions of disease are clear, directions as to treatment definite, and disputed matters and theories are omitted. Altogether it is a most useful text-book."

Journal of Nervous and Mental Diseases

"The best text-book exposition of this subject of our day for the busy practitioner. . . . The chapter on idiocy and imbecility is undoubtedly the best that has been given us in any work of recent date upon mental diseases. The photographic illustrations of this part of Dr. Peterson's work leave nothing to be desired."

New York Medical Journal

"To be clear, brief, and thorough, and at the same time authoritative, are merits that ensure popularity. The medical student and practitioner will find in this volume a ready and reliable resource."

Kerr's Diagnostics of Diseases of Children

Diagnostics of the Diseases of Children. By LeGrand Kerr, M. D., Professor of Diseases of Children, Brooklyn Postgraduate Medical School, Brooklyn. Octavo of 542 pages, fully illustrated. Cloth, $5.00 net; Half Morocco, $6.50 net.

FOR THE PRACTITIONER

Dr. Kerr's work differs from all others on the diagnosis of diseases of children in that the *objective symptoms* are particularly emphasized. The constant aim throughout has been to render a correct diagnosis as early in the course of the disease as possible, and for this reason differential diagnosis is presented from the very earliest symptoms. The many original illustrations will be found helpful.

New York State Journal of Medicine

"The illustrations are excellent and numerous. It will meet the needs of the great mass of physicians who treat the diseases of infancy and childhood."

Kerley's Treatment of Diseases of Children

Treatment of the Diseases of Children. By Charles Gilmore Kerley, M. D., Professor of Diseases of Children, New York Polyclinic School and Hospital. Octavo of 628 pages, illustrated. Cloth, $5.00 net; Half Morocco, $6.50 net.

THE NEW (2d) EDITION

This work has been prepared for the physician engaged in general practice. The author *presents all the modern methods of management and treatment in greater detail than any other work on the subject* heretofore published. The methods suggested are the results of actual personal experience, extending over a number of years of hospital and private practice. There is an excellent illustrated chapter on Gymnastic Therapeutics.

The British Medical Journal

"Dr. Kerley's book is one of the best on the subject that has come under our notice. All through it shows evidence of ripe experience and sound judgment."

The New "Dorland"

New (6th) Edition, Entirely Reset

The American Illustrated Medical Dictionary. A new and complete dictionary of the terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Veterinary Science, Nursing, and kindred branches; with over 100 new and elaborate tables and many handsome illustrations. By W. A. NEWMAN DORLAND, M. D. Large octavo, 986 pages, bound in full flexible leather, $4.50 net; with thumb index, $5.00 net.

Dorland's Dictionary defines hundreds of the newest terms not defined in any other dictionary—bar none. It gives the capitalization and pronunciation of all words. It makes a feature of the derivation or etymology of the words. In "Dorland" every word has a separate paragraph, thus making it easy to find a word quickly. The tables of arteries, muscles, nerves, veins, etc., are of the greatest help in assembling anatomic facts. In "Dorland" every word is given its definition—a definition that *defines* in the fewest possible words.

Howard A. Kelly, M. D., *Johns Hopkins University, Baltimore.*

"Dr. Dorland's dictionary is admirable. It is so well gotten up and of such convenient size. No errors have been found in my use of it."

Goodnow's First-Year Nursing

Just Ready

First-Year Nursing. By MINNIE GOODNOW, R. N., formerly Superintendent of the Women's Hospital, Denver. 12mo of 325 pages, illustrated.

Miss Goodnow's work deals *entirely* with the *practical* side of first-year nursing work. It is the *application* of text-book knowledge. It tells the nurse *how* to do those things she is called upon to do in her first year in the training school—the *actual ward work.*

Roberts' Bacteriology and Pathology for Nurses

Just Ready

Bacteriology and Pathology for Nurses. By JAY G. ROBERTS, PH. G., M. D., Oskaloosa, Iowa. 12mo of 200 pages, illustrated.

This new work is practical in the strictest sense. Written specially for nurses, it confines itself to information that the nurse should know. All unessential matter is excluded. The style is concise and to the point, yet clear and plain. The text is illustrated throughout.

Nursing in Diseases of the Eye, Ear, Nose, and Throat

Nursing in Diseases of the Eye, Ear, Nose, and Throat. By the Committee on Nurses of the Manhattan Eye, Ear, and Throat Hospital: J. EDWARD GILES, M. D., Surgeon in the Eye Department; ARTHUR B. DUEL, M. D. (Chairman), Surgeon in the Ear Department; HARMON SMITH, M. D., Surgeon in the Throat Department. Assisted by JOHN R. SHANNON, M. D., Assistant Surgeon in the Eye Department; and JOHN R. PAGE, M. D., Assistant Surgeon in the Ear Department. With chapters by HERBERT B. WILCOX, M. D., Attending Physician to the Hospital; and Miss EUGENIA D. AYERS, Superintendent of Nurses. 12mo of 260 pages, illustrated. Cloth, $1.50 net.

A VALUABLE BOOK

This is a practical book, prepared by surgeons who, from their experience in the operating amphitheater and at the bedside, have realized the shortcomings of present nursing books in regard to eye, ear, nose, and throat nursing. The scope of the work has been limited to what an intelligent nurse should know, and the style throughout is simple, plain, and definite.

New York Medical Journal

"Every side of the question has been fully taken into consideration."

Stoney's Materia Medica for Nurses

Practical Materia Medica for Nurses, with an Appendix containing Poisons and their Antidotes, with Poison-Emergencies; Mineral Waters; Weights and Measures; Dose-List, and a Glossary of the Terms used in Materia Medica and Therapeutics. By EMILY A. M. STONEY, formerly of the Carney Hospital, South Boston. 12mo of 300 pages, Cloth, $1.50 net.

THE NEW (3d) EDITION

In making the revision for this new third edition, all the newer drugs have been introduced and fully discussed. The consideration of the drugs includes their sources and composition, their various preparations, physiologic actions, directions for administering, and the symptoms and treatment of poisoning.

Journal of the American Medical Association

"So far as we can see, it contains everything that a nurse ought to know in regard to drugs. As a reference-book for nurses it will without question be very useful."

Sanders' Nursing

Modern Methods in Nursing. By GEORGIANA J. SANDERS, formerly Superintendent of Nurses at the Massachusetts General Hospital. 12mo of 881 pages, with 227 illustrations. Cloth, $2.50 net.

JUST READY

Miss Sanders' book gives only *modern* methods. Then it gives the *details* of nursing *operation cases*, both in the hospital and in the home. The thorough way in which *ward work* is taken up makes her book indispensable for teaching purposes. In giving directions for mustard baths, poultices, etc., the *quantities* are given exactly. This is an important point often overlooked.

Stoney's Nursing

Practical Points in Nursing. By EMILY A. M. STONEY. 12mo of 495 pages, illustrated. Cloth, $1.75 net.

THE NEW (4th) EDITION

In this volume the author explains the entire range of *private* nursing as distinguished from *hospital* nursing, and the nurse is instructed how best to meet the various emergencies of medical and surgical cases when distant from medical or surgical aid or when thrown on her own resources. An especially valuable feature will be found in the directions how to *improvise* everything ordinarily needed in the sick-room.

Stoney's Technic for Nurses

Bacteriology and Surgical Technic for Nurses. By EMILY A. M. STONEY, formerly Superintendent at Carney Hospital, South Boston. Revised by FREDERIC R. GRIFFITH, M. D., Surgeon, of New York. 12mo, 311 pages, illustrated. Cloth, $1.50 net.

THE NEW (3d) EDITION

Trained Nurse and Hospital Review

"These subjects are treated most accurately and up to date, without the superfluous reading which is so often employed. . . . Nurses will find this book of the greatest value both during their hospital course and in private practice."

Aikens' Primary Studies for Nurses

Illustrated

PRIMARY STUDIES FOR NURSES: A Text-Book for First-year Pupil Nurses. By CHARLOTTE A. AIKENS, formerly Director of Sibley Memorial Hospital, Washington, D. C. 12mo of 450 pages, illus. Cloth, $1.75 net.

This work brings together in concise form well-rounded courses of lessons in all subjects which, with practical nursing technic, constitute the primary studies in a nursing course.

Trained Nurse and Hospital Review

"It is safe to say that any pupil who has mastered even the major portion of this work would be one of the best prepared first-year pupils that ever stood for examination."

Aikens' Clinical Studies for Nurses

Second and Third Years

CLINICAL STUDIES FOR NURSES. By CHARLOTTE A. AIKENS, formerly Director of Sibley Memorial Hospital, Washington, D. C. 12mo of 510 pages, illustrated. Cloth, $2.00 net.

This new work is written along the same lines as Miss Aikens' former work on "Primary Studies," to which it is a companion volume. It takes up all subjects taught during the second and third years and takes them up in a concise, forceful way.

Dietetic and Hygienic Gazette

"There is a large amount of practical information in this book which the experienced nurse, as well as the undergraduate, will consult with profit. The illustrations are numerous and well selected."

Aikens' Training-School Methods

HOSPITAL TRAINING-SCHOOL METHODS AND THE HEAD NURSE. By CHARLOTTE A. AIKENS, formerly Director of Sibley Memorial Hospital, Washington, D. C. 12mo of 267 pages. Cloth, $1.50 net.

Trained Nurse and Hospital Review

"There is not a chapter in the book that does not contain valuable suggestions."

Aikens' Hospital Management

Extremely Practical

HOSPITAL MANAGEMENT. BY CHARLOTTE A. AIKENS, formerly Director of Sibley Memorial Hospital, Washington, D. C. 12mo of 488 pages, illustrated. Cloth, $3.00 net.

The Medical Record

"Tells in concise form exactly what a hospital should do and how it should be run, from the scrubwoman up to its financing. A valuable addition to our literature on this subject."

Hoxie's Medicine for Nurses

Practice of Medicine for Nurses. A Text-Book for Nurses and Students of Domestic Science, and a Hand-Book for All Those Who Care for the Sick. By GEORGE HOWARD HOXIE, M. D., Professor of Internal Medicine, University of Kansas. With a Chapter on Technic of Nursing by PEARL L. LAPTAD, Principal of the Training School for Nurses, University of Kansas. 12mo of 284 pages, illustrated. Cloth, $1.50 net.

This work is truly a practice of medicine for the nurse, enabling her to recognize any signs and changes that may occur between visits of the physician, and, if necessary, to combat them until the physician's arrival. This information the author presents in a way most acceptable, particularly emphasizing the nurse's part.

Trained Nurse and Hospital Review

"This book has our unqualified approval."

McCombs' Diseases of Children for Nurses New (2d) Edition

Diseases of Children for Nurses. By ROBERT S. MCCOMBS, M. D., Instructor of Nurses at the Children's Hospital of Philadelphia. 12mo of 470 pages, illustrated. Cloth, $2.00 net.

Dr. McCombs' experience in lecturing to nurses has enabled him to emphasize *just those points that nurses most need to know.* The nursing side has been written by head nurses, especially praiseworthy being the work of Miss Jennie Manly.

National Hospital Record

"We have needed a good work on children's diseases adapted for nurses' use, and this volume admirably fills the want."

Wilson's Obstetric Nursing The New (2d) Edition

A Reference Hand-Book of Obstetric Nursing. By W. REYNOLDS WILSON, M. D., Visiting Physician to the Philadelphia Lying-in Charity. 32mo of 256 pages, illustrated. Flexible leather, $1.25 net.

Dr. Wilson's work discusses the subject of obstetrics entirely from the nurse's point of view, presenting in detail everything connected with pregnancy and labor and their management. The text is copiously illustrated.

American Journal of Obstetrics

"Every page emphasizes the nurse's relation to the case."

Frühwald and Westcott on Children

Diseases of Children. A Practical Reference Book for Students and Practitioners. By PROFESSOR DR. FERDINAND FRÜHWALD, of Vienna. Edited, with additions, by THOMPSON S. WESTCOTT, M. D., University of Pennsylvania. Octavo, 533 pages, 176 illustrations. Cloth, $4.50 net.

Boyd's State Registration for Nurses

State Registration for Nurses. By LOUIE CROFT BOYD, R. N., Graduate Colorado Training-school for Nurses. Octavo of 42 pages. 50 cents net.

Macfarlane's Gynecology for Nurses

Illustrated

A REFERENCE HAND-BOOK OF GYNECOLOGY FOR NURSES. By CATHARINE MACFARLANE, M. D., Gynecologist to the Woman's Hospital of Philadelphia. 32mo of 150 pages, with 70 illustrations. Flexible leather, $1.25 net.

A. M. Seabrook, M. D., *Woman's Medical College of Philadelphia.*

"It is a most admirable little book, covering in a concise but attractive way the subject from the nurse's standpoint."

Galbraith's Personal Hygiene for Women

PERSONAL HYGIENE AND PHYSICAL TRAINING FOR WOMEN. By ANNA M. GALBRAITH, M.D., Fellow New York Academy of Medicine, 12mo of 371 pages, with original illustrations. Cloth, $2.00 net.

Dietetic and Hygienic Gazette

"It contains just the sort of information which is very greatly needed by the weaker sex. Its illustrations are excellent."

De Lee's Obstetrics for Nurses

New (3d) Edition

OBSTETRICS FOR NURSES. By JOSEPH B. DE LEE, M. D., Professor of Obstetrics in the Northwestern University Medical School. 12mo volume of 512 pages, fully illustrated. Cloth, $2.50 net.

J. Clifton Edgar, M. D.,

Professor of Obstetrics and Clinical Midwifery, Cornell Medical School, N. Y.

"It is far-and-away the best that has come to my notice, and I shall take great pleasure in recommending it to my nurses and students as well."

Davis' Obstetric Nursing

New (3d) Edition

OBSTETRIC AND GYNECOLOGIC NURSING. By EDWARD P. DAVIS, A. M., M. D., Professor of Obstetrics, Jefferson Medical College and Philadelphia Polyclinic. 12mo of 436 pages, illustrated. Buckram, $1.75 net.

The Lancet, London

"Not only nurses, but even newly qualified medical men, would learn a great deal by a perusal of this book. It is written in a clear and pleasant style, and is a work we can recommend."

Beck's Hand-Book for Nurses

New (2d) Edition

A REFERENCE HAND-BOOK FOR NURSES. By AMANDA K. BECK, of Chicago, Ill. 32mo of 200 pages. Flexible leather, $1.25 net.

Aikens' Home Nurse's Hand-Book

Just Ready

HOME NURSE'S HAND-BOOK. BY CHARLOTTE A. AIKENS. 12mo of 276 pages, illustrated. Cloth, $1.50 net.

The point about this work is this: It tells you and *shows* you just how to do those little but important things often omitted from other nursing books. "Home Treatments" and "Points to be Remembered"—terse, crisp reminders—stand out as particularly practical. Just the book for those who have the *home-care* of the sick.

Register's Fever Nursing

A Text-Book on Practical Fever Nursing. By Edward C. Register, M. D., Professor of the Practice of Medicine in the North Carolina Medical College. 12mo of 352 pages. Cloth, $2.50 net.

The work completely covers the field of practical fever nursing. The illustrations show the nurse how to perform those measures that come within her province.

Trained Nurse and Hospital Review

"Nurses will find this book of great value in this practical branch of their work."

Hecker, Trumpp, and Abt on Children

Atlas and Epitome of Diseases of Children. By Dr. R. Hecker and Dr. J. Trumpp, of Munich. Edited, with additions, by Isaac A. Abt, M.D., Assistant Professor of Diseases of Children, Rush Medical College, Chicago. With 48 colored plates, 144 text-cuts, and 453 pages of text. Cloth, $5.00 net.

The many excellent lithographic plates represent cases seen in the authors' clinics, and have been selected with great care, keeping constantly in mind the practical needs of the general practitioner. These beautiful pictures are so true to nature that their study is equivalent to actual clinical observation. The editor, Dr. Isaac A. Abt, has added all new methods of treatment.

Johns Hopkins Hospital Bulletin

"The entire field has been covered. With the excellent plates, it will be found of real value to both students and practitioners."

Lewis' Anatomy and Physiology **The New (2d) Edition**

Anatomy and Physiology for Nurses. By LeRoy Lewis, M. D., Formerly Surgeon to and Lecturer on Anatomy and Physiology for Nurses at the Lewis Hospital, Bay City, Michigan. 12mo of 344 pages, with 161 illustrations. Cloth, $1.75 net.

A demand for such a work as this, *treating the subjects from the nurses' point of view*, has long existed. Dr. Lewis has based the plan and scope of this work on the methods employed by him in teaching these branches, making the text unusually simple and clear.

The Nurses Journal of the Pacific Coast

"It is not in any sense rudimentary, but comprehensive in its treatment of the subjects in hand. The application of the knowledge of anatomy in the care of the patient is emphasized."

Friedenwald and Ruhräh's Dietetics **New (2d) Edition**

Dietetics for Nurses. By Julius Friedenwald, M. D., Professor of Diseases of the Stomach, and John Ruhräh, M. D., Professor of Diseases of Children, College of Physicians and Surgeons, Baltimore. 12mo volume of 395 pages. Cloth, $1.50 net.

This work has been prepared to meet the needs of the nurse, both in the training school and after graduation. It aims to give the essentials of dietetics, considering briefly the physiology of digestion and the various classes of foods and the part they play in nutrition.

American Journal of Nursing

"It is exactly the book for which nurses and others have long and vainly sought. A simple manual of dietetics, which does not turn into a cook-book at the end of the first or second chapter.

Paul's Fever Nursing

New (2d) Edition

NURSING IN THE ACUTE INFECTIOUS FEVERS. By GEORGE P. PAUL, M. D., formerly Assistant Visiting Physician to the Samaritan Hospital, Troy, N. Y. 12mo of 246 pages. Cloth, $1.00 net.

Dr. Paul has taken great pains in the presentation of the care and management of each fever. The book treats of fevers in general, then each fever is discussed individually, and the latter part of the book deals with practical procedures and valuable information.

The London Lancet

"The book is an excellent one and will be of value to those for whom it is intended. It is well arranged, the text is clear and full, and the illustrations are good."

Paul's Materia Medica for Nurses

New (2d) Edition

MATERIA MEDICA FOR NURSES. By GEORGE P. PAUL, M. D., formerly Assistant Visiting Physician to the Samaritan Hospital, Troy. 12mo of 282 pages. Cloth, $1.50 net.

Dr. Paul arranges the physiologic actions of the drugs according to the action of the drug and not the organ acted upon. An important section is that on pretoxic signs, giving the warnings of the full action or the beginning toxic effects of the drug, which, if heeded, may prevent many cases of drug poisoning.

The Medical Record, New York

"This volume will be of real help to nurses; the material is well selected and well arranged, and the book is as readable as it is useful."

Pyle's Personal Hygiene

The New (4th) Edition

A MANUAL OF PERSONAL HYGIENE: Proper Living upon a Physiologic Basis. By Eminent Specialists. Edited by WALTER L. PYLE, A. M., M.D., Assistant Surgeon to Wills Eye Hospital, Philadelphia. Octavo volume of 472 pages, fully illustrated. Cloth, $1.50 net.

To this new edition there have been added, and fully illustrated, chapters on Domestic Hygiene and Home Gymnastics, besides an appendix containing methods of Hydrotherapy, Mechanotherapy, and First Aid Measures. There is also a Glossary of the medical terms used.

Boston Medical and Surgical Journal

"The work has been excellently done, there is no undue repetition, and the writers have succeeded unusually well in presenting facts of practical significance based on sound knowledge."

Galbraith's Four Epochs of Woman's Life

Second Edition

THE FOUR EPOCHS OF WOMAN'S LIFE. By ANNA M. GALBRAITH, M.D. With an Introductory Note by JOHN H. MUSSER, M.D., University of Pennsylvania. 12mo of 247 pages. Cloth, $1.50 net.

Birmingham Medical Review

"We do not as a rule care for medical books written for the instruction of the public; but we must admit that the advice in Dr. Galbraith's work is in the main wise and wholesome."

Spratling on Epilepsy

EPILEPSY AND ITS TREATMENT. By WILLIAM P. SPRATLING, M. D., Professor of Physiology and Nervous Diseases, College of Physicians and Surgeons, Baltimore. Octavo of 522 pages, fully illustrated. Cloth, $4.00 net.

The Lancet, London

"Dr. Spratling's work is written throughout in a clear and readable style. . . . The work is a mine of information on the whole subject of epilepsy and its treatment."

Brower and Bannister on Insanity

A Practical Manual of Insanity. For the Student and General Practitioner. By DANIEL R. BROWER, A. M., M. D., LL. D., formerly Professor of Nervous and Mental Diseases in Rush Medical College, in affiliation with the University of Chicago; and HENRY M. BANNISTER, A.M., M.D., formerly Senior Assistant Physician, Illinois Eastern Hospital for the Insane. Handsome octavo of 426 pages, with a number of full-page inserts. Cloth, $3.00 net.

FOR STUDENT AND PRACTITIONER

This work, intended for the student and general practitioner, is an intelligible, up-to-date exposition of the leading facts of psychiatry, and will be found of invaluable service, especially to the busy practitioner unable to yield the time for a more exhaustive study. The work has been rendered more practical by omitting elaborate case records and pathologic details, as well as discussions of speculative and controversial questions.

American Medicine

"Commends itself for lucid expression in clear-cut English, so essential to the student in any department of medicine. . . . Treatment is one of the best features of the book, and for this aspect is especially commended to general practitioners."

Bergey's Hygiene

The Principles of Hygiene: A Practical Manual for Students, Physicians, and Health Officers. By D. H. BERGEY, A. M., M. D., Assistant Professor of Bacteriology in the University of Pennsylvania. Octavo volume of 555 pages, illustrated. Cloth, $3.00 net.

THE NEW (3d) EDITION

This book is intended to meet the needs of students of medicine in the acquirement of a knowledge of those principles upon which modern hygienic practises are based, and to aid physicians and health officers in familiarizing themselves with the advances made in hygiene and sanitation in recent years. This new third edition has been very carefully revised, and much new matter added, so as to include the most recent advancements.

Buffalo Medical Journal

"It will be found of value to the practitioner of medicine and the practical sanitarian; and students of architecture, who need to consider problems of heating, lighting, ventilation, water supply, and sewage disposal, may consult it with profit."

Griffith's Care of the Baby

The Care of the Baby. By J. P. CROZER GRIFFITH, M. D., Clinical Professor of Diseases of Children, University of Penn.; Physician to the Children's Hospital, Phila. 12mo, 455 pp. Illustrated. Cloth, $1.50 net.

THE NEW (5th) EDITION

The author has endeavored to furnish a reliable guide for mothers. He has made his statements plain and easily understood, so that the volume will be of service to mothers and nurses.

New York Medical Journal

"We are confident if this little work could find its *way* into the hands of every trained nurse and of every mother, infant mortality would be lessened by at least fifty per cent."

Grulee's Infant Feeding

Infant Feeding. By CLIFFORD G. GRULEE, M. D., Assistant Professor of Pediatrics at Rush Medical College. Octavo of 295 pages, illustrated, including 8 in colors. Cloth, $3.00 net.

JUST READY

Dr. Grulee tells you *how* to feed the infant. He tells you—and *shows* by clear illustrations—the *technic* of giving the child the breast. Then artificial feeding is thoughtfully presented, including a number of simple formulas. The colored illustrations showing the actual shapes and appearances of stools are extremely valuable.

Ruhräh's Diseases of Children

A Manual of Diseases of Children. By JOHN RUHRÄH, M. D., Professor of Diseases of Children, College of Physicians and Surgeons, Baltimore. 12mo of 534 pages, fully illustrated. Flexible leather, $2.50 net.

THE NEW (3d) EDITION

In revising this work for the second edition Dr. Ruhräh has carefully incorporated all the latest knowledge on the subject. All the important facts are given concisely and explicitly, the therapeutics of infancy and childhood being outlined very carefully and clearly. There are also directions for dosage and prescribing, and many useful prescriptions are included.

American Journal of the Medical Sciences

"Treatment has been satisfactorily covered, being quite in accord with the best teaching, yet withal broadly general and free from stock prescriptions."

Peterson and Haines' Legal Medicine & Toxicology

A Text-Book of Legal Medicine and Toxicology. Edited by FREDERICK PETERSON, M. D., Professor of Psychiatry in the College of Physicians and Surgeons, New York; and WALTER S. HAINES, M. D., Professor of Chemistry, Pharmacy, and Toxicology, Rush Medical College, in affiliation with the University of Chicago. Two imperial octavo volumes of about 750 pages each, fully illustrated. Per volume: Cloth, $5.00 net; Sheep or Half Morocco, $6.50 net. *Sold by Subscription.*

IN TWO VOLUMES

The object of the present work is to give to the medical and legal professions a comprehensive survey of forensic medicine and toxicology in moderate compass. This, it is believed, has not been done in any other recent work in English. Under "Expert Evidence" not only is advice given to medical experts, but suggestions are also made to attorneys as to the best methods of obtaining the desired information from the witness. An interesting and important chapter is that on "The Destruction and Attempted Destruction of the Human Body by Fire and Chemicals." A chapter not usually found in works on legal medicine is that on "The Medicolegal Relations of the X-Rays."

Columbia Law Review

"For practitioners in criminal law and for those in medicine who are called upon to give court testimony in all its various forms . . . it is extremely valuable."

Fiske's Human Body

Structure and Functions of the Body. By ANNETTE FISKE, A.M., Graduate of the Waltham Training School for Nurses. 12mo of 221 pages, illustrated. Cloth, $1.25 net.

PRESENTED IN A NEW WAY

The way in which this book presents anatomy and physiology is a departure from the usual method—a departure, however, of a very practical kind. Miss Fiske has woven the physiology in with the anatomy, thus making her work a most readable one. It is an extremely practical book—one that can be readily understood.

Draper's Legal Medicine

A Text-Book of Legal Medicine. By FRANK WINTHROP DRAPER, A. M., M. D., Late Professor of Legal Medicine in Harvard University, Boston. Octavo of 573 pages, illustrated. Cloth, $4.00 net; Half Morocco, $5.50 net.

Chapman's Medical Jurisprudence

Third Edition

Medical Jurisprudence, Insanity, and Toxicology. By HENRY C. CHAPMAN, M. D., late Professor of Institutes of Medicine and Medical Jurisprudence in Jefferson Medical College, Philadelphia. 12mo of 329 pages, illustrated. Cloth, $1.75 net.

Golebiewski and Bailey's Accident Diseases

Atlas and Epitome of Diseases Caused by Accidents. By DR. ED. GOLEBIEWSKI, of Berlin. Edited, with additions, by PEARCE BAILEY, M. D., Consulting Neurologist to St. Luke's Hospital, New York. With 71 colored illustrations on 40 plates, 143 text illustrations, and 549 pages of text. Cloth, $4.00 net. *In Saunders' Hand-Atlas Series.*

Hofmann and Peterson's Legal Medicine

In Saunders' Hand-Atlases

Atlas of Legal Medicine. By DR. E. VON HOFMANN, of Vienna. Edited by FREDERICK PETERSON, M. D., Professor of Psychiatry in the College of Physicians and Surgeons, New York. With 120 colored figures on 56 plates and 193 half-tone illustrations. Cloth, $3.50 net.

Jakob and Fisher's Nervous System

Saunders' Atlases

Atlas and Epitome of the Nervous System and its Diseases. By PROFESSOR DR. CHR. JAKOB, of Erlangen. Edited, with additions, by EDWARD D. FISHER, M. D., University and Bellevue Hospital Medical College. With 83 plates and copious text. Cloth, $3.50 net.

Crothers' Morphinism and Narcomania

Morphinism and Narcomania. By T. D. CROTHERS, M. D. 12mo of 351 pages. Cloth, $2.00 net.

Abbott's Transmissible Diseases

Second Edition

The Hygiene of Transmissible Diseases: Their Causes, Modes of Dissemination, and Methods of Prevention. By A. C. ABBOTT, M. D., Professor of Hygiene and Bacteriology, University of Pennsylvania. Octavo of 351 pages, illustrated. Cloth, $2.50 net.

American Pocket Dictionary

New (7th) Edition

AMERICAN POCKET MEDICAL DICTIONARY. Edited by W. A. NEWMAN DORLAND, M. D., Editor "American Illustrated Medical Dictionary." Containing the pronunciation and definition of the principal words used in medicine and kindred sciences, with 64 extensive tables. With 610 pages. Flexible leather, with gold edges, $1.00 net; with patent thumb index, $1.25 net.

"I can recommend it to our students without reserve."—J. H. HOLLAND, M. D., *Dean of the Jefferson Medical College*, Philadelphia.

Morrow's Immediate Care of Injured

New (2d) Edition

IMMEDIATE CARE OF THE INJURED. By ALBERT S. MORROW, M. D., Adjunct Professor of Surgery at the New York Polyclinic. Octavo of 360 pages, with 242 illustrations. Cloth, $2.50 net.

Dr. Morrow's book on emergency procedures is written in a definite and decisive style, the reader being told just what to do in every emergency. It is a practical book for every day use, and the large number of excellent illustrations can not but make the treatment to be pursued in any case clear and intelligible. Physicians and nurses will find it indispensible.

Powell's Diseases of Children

Third Edition, Revised

ESSENTIALS OF THE DISEASES OF CHILDREN. By WILLIAM M. POWELL, M. D. Revised by ALFRED HAND, JR., A. B., M. D., Dispensary Physician and Pathologist to the Children's Hospital, Philadelphia. 12mo volume of 259 pages. Cloth, $1.00 net. *In Saunders' Question-Compend Series.*

Shaw on Nervous Diseases and Insanity

Fourth Edition

ESSENTIALS OF NERVOUS DISEASES AND INSANITY: Their Symptoms and Treatment. A Manual for Students and Practitioners. By the late JOHN C. SHAW, M. D., Clinical Professor of Diseases of the Mind and Nervous System, Long Island College Hospital, New York. 12mo of 204 pages, illustrated. Cloth, $1.00 net. *In Saunders' Question-Compend Series.*

"Clearly and intelligently written; we have noted few inaccuracies and several suggestive points. Some affections unmentioned in many of the large text-books are noted."—*Boston Medical and Surgical Journal.*

Starr's Diets for Infants and Children

DIETS FOR INFANTS AND CHILDREN IN HEALTH AND IN DISEASE. By LOUIS STARR, M. D., Consulting Pediatrist to the Maternity Hospital, Philadelphia. 230 blanks (pocket-book size). Bound in flexible leather, $1.25 net.

Grafstrom's Mechano-Therapy

Second Revised Edition

A TEXT-BOOK OF MECHANO-THERAPY (Massage and Medical Gymnastics). By AXEL V. GRAFSTROM, B. Sc., M. D., Attending Physician to the Gustavus Adolphus Orphange, Jamestown, New York. 12mo, 200 pages, illustrated. Cloth, $1.25 net.

HC 2ECJ X